ROTUNDA

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Of Terracotta and Bronze
Discovering New Worlds
Beyond the City
Food for Thought
Potter by the Maitland

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ROTUNDA

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Cover: *The Wrestlers*, a sculpture in bronze by Massimiliano Soldani-Benzi (1656–1740). Gift of Margaret and Ian Ross. Photograph by Bill Robertson.

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On a New Life Sciences Gallery

Glenn B. Wiggins

THE RECENT OPENING of the gallery *An Introduction to the Life Sciences* brings a new dimension to science interpretation at the ROM—and one that has been little explored by museums generally. Conventional museum exhibits deal for the most part with animal species, habitats, and distributions, and the sustained large numbers of visitors to the Life Sciences galleries over the years confirm that the exhibits are effective. But confined to this level, museum galleries do not reveal to the viewer underlying principles common to all living things—plant, animal, and man himself.

Located in the central rotunda of the Life Sciences galleries on the third floor, the new exhibit introduces some of the most far-reaching concepts yet advanced by science: *Origin of Life, Genetic Basis for Evolution, Natural Selection, Five Kingdoms of Living Organisms, Diversity in the Animal Kingdom, Ecological Relationships,* and *Global Distribution of Animals.* In the course of the renovation programme many ROM Life Sciences galleries will be changed to relate more directly to the introductory gallery.

The exhibit *Origin of Life* summarizes present thinking in science on plausible means by which life could have arisen. Substances with some of the properties essential to life have been produced in laboratory experiments combining elements that are thought to have been present on the primeval planet Earth. Under natural conditions similar chemical reactions could have produced the first living things; these would have been very simple single-celled organisms. The basis for change leading to greater complexity and diversity of organisms is considered in the exhibit *Genetic Basis for Evolution.* Particles of hereditary material or genes arranged linearly as paired chromosomes in the cells of living organisms determine the characteristics of each individual; but individuals differ because each one is endowed with different sets of genes from his parents, and also because certain of his own genes may undergo spontaneous changes or mutations. It is this potential to be slightly different, even among progeny of the same parents, that enables living organisms to change from generation to generation. Because of these genetic differences, some individuals are more successful than others under certain conditions of the natural environment in which they live. Progeny of the more successful individuals will outnumber those of the others, and thus the genetic composition of the population changes in accordance with the principle of *Natural Selection,* the subject of another of the exhibits. Biologists believe that genetic diversity shaped by natural selection is the underlying mechanism for organic evolution—the change from simple organisms to increasingly complex forms over the some 3 billion years that life has existed on the planet Earth.

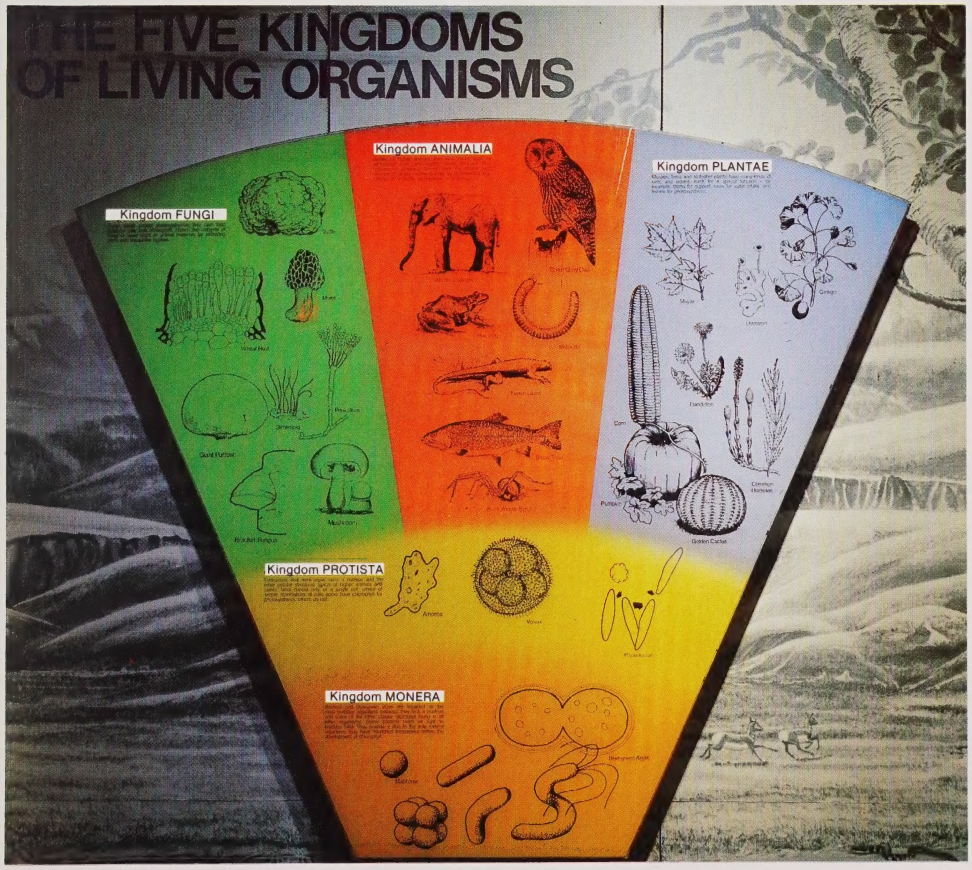
An overview of the range of that diversity is offered in the exhibit *Five Kingdoms of Living Organisms.* Not many years have passed since students in even advanced courses in biology learned that all living things were of two major groups or kingdoms—plants or animals. New insights into the structure and processes of living things have revealed that there are at least five major groups of organisms: Monera—single-celled organisms such as bacteria and blue-green algae—are the most primitive because they lack among other things a cell nucleus and some of the other cellular structures present in all other organisms; Protista—protozoans and most algae—are simple organisms but they do have the nucleus and other cellular inclusions common to all higher forms from amoebae to oak trees and elephants, and including humans; and three kingdoms of multicellular organisms—Plantae, Animalia, and Fungi. It is intriguing to see that each of these three higher kingdoms represents a unique approach to gaining a share of the energy available in the world: plants through possession of chlorophyll use the energy of the sun to manufacture their own food materials from carbon dioxide, water, and certain other substances; animals depend entirely upon the success of plants by ingesting plant tissues or by eating other animals that have done so; and fungi, lacking both chlorophyll and mouths, absorb their energy resources through cell walls from plant or animal materials. The complex interdependence of organisms in all five kingdoms is stressed in the exhibit *Ecological Relationships.* Although only a small fraction of the sun's energy reaching Earth is used by plants, and an even smaller proportion by animals, this is still sufficient to support an incredible array of different types of organisms, including man. This never-ending competition for energy is, in fact, the cutting edge of natural selection which, as we saw earlier, is the innovative process underlying organic diversity.

Diversity in the Animal Kingdom is treated in a 10-minute slide and sound show in a multi-screen theatre. Evolution of the animal kingdom over some 700 million years is awesome by any standard, both for the diversity of animal types that has appeared and for the number of distinct kinds or species—approximate-

ly 1.5 million now known to science, with the estimated total number of living species far beyond that figure. Viewers will see that science places the human species and related forms within the animal kingdom, recent products of the same evolutionary process responsible for all other organisms. Finally, the exhibit *Global Distribution* relates how scientists see the occurrence of living organisms over the face of the globe to be governed by geological phenomena, including the concept of shifting continents.

The purpose of the new exhibit is, then, to help the Museum visitor to see something of how the natural world came to be; and like all theories in science, some of these concepts may change as new evidence emerges. Against this background, the deeper significance of the more specialized galleries of living and fossil animals then becomes apparent to the visitor. In a very real sense, the new gallery embodies the ROM theme of Mankind Discovering—much of what is now known about animal diversity has been derived from research collections of organisms from all parts of the world assembled by scientists in museums such as the ROM, and visitors to the ROM galleries will in turn perceive more about the mysteries of life on Earth.

Glenn B. Wiggins is Curator, Department of Entomology and Invertebrate Zoology, Royal Ontario Museum, and Professor, Department of Zoology, University of Toronto.



Of Terracotta and Bronze

Newly Acquired European Sculpture

K. Corey Keeble

DURING THE SUMMER OF 1978 the European Department of the ROM added three important pieces to its collection of sculptures in bronze and terracotta. The first—a small bronze maquette by the French sculptor Aimé-Jules Dalou (1838–1902)—was purchased from the Heim Gallery in London. Then Margaret and Ian Ross, good and long-standing friends of the museum, made a gift of two superb examples of Florentine Baroque sculpture: a group of *The Wrestlers* by M. Soldani-Benzi (1656–1740) and an oval terracotta relief of *The Virgin and Child* by Giovanni Battista Foggini (1652–1725).

The Dalou bronze is the second of a set of ten "bronzes d'édition" of one of his studies for the sculpture groups he designed after 1898 for the decoration of the Pont Alexandre III in Paris. It depicts a lion and striding *putto* on a rectangular slab base. Near the back of the base appear the incised signature "Dalou" and the impressed mark "CIRE/PERDUE/A. HEBRARD" and on the back edge of the base there is an incised number "2" within an oval.

Dalou, one of the most sensitive and accomplished sculptors of his period, followed a practice of sculptors that had endured at least since the time of the Renaissance of working up in clay or wax small three-dimensional models for his larger works. Such models, which provide important clues to the direction of the creative process —from an original idea to its fulfilment in a finished work of art—had also occupied an important place in the development of European art from the time of the Renaissance. Models and sketches, frequently worked up quickly and left in a rough state, became as important to collectors and connoisseurs as the finished works themselves. That they were often collected in their own right is attested by the survival of the notebooks of Leonardo da Vinci, of innumerable "Old Master" drawings, and of wax and clay models attributed to sculptors such as Giovanni Bologna.

Dalou's small models, although of a much later date, are still part of a tradition going back to the Renaissance. Although they served a practical purpose as preparatory pieces, they deserve to be studied and appreciated on their own terms as independent works of art. One of their most striking qualities is, simply stated, spontaneity. They were blocked out in rough to give an approximation of volume and mass and are devoid of the smoothness of finish and sharpness of detail frequently associated with finished works in bronze. This very roughness, however, has its own special appeal, for it enables us to see how the sculptor worked the initial clay or wax maquettes with his own hands. The little maquette now in the ROM collection is only a few inches in height, and yet it is visually tremendously powerful—far beyond its deceptively diminutive scale.

Above: Detail of The Wrestlers *by Massimiliano Soldani-Benzi (1656–1740).*

Opposite page: Aimé-Jules Dalou's bronze maquette for a sculpture group for the decoration of the Pont Alexandre III in Paris. French, after 1898.

The original models of clay or wax Dalou used for his sculptures were by their very nature all too susceptible to the ravages of time. Hébrard, the founder who usually cast Dalou's sculptures, translated them into bronze after 1907. It is, however, the image of wax that remains, down to the detail of a fingerprint on the sculpture to the left of the lion's tail.

As was customary at the time, the bronzes from the Dalou maquettes were issued by Hébrard in a limited number of copies—rather akin to limited editions of prints and books. Such bronzes were in fact called "éditions bronzes", or "bronzes d'édition".

The Dalou bronzes are reminiscent of another group of maquettes or sketches, which were originally executed in wax and later cast in bronze. Those were, of course, the studies in movement, the dancer statuettes, executed by Degas and cast in bronze by the same Hébrard who cast the Dalou figures.

In style and manner of execution the ROM maquette is similar to other Dalou studies, such as the portrait of a seated man believed to represent Edouard Pailleron (No. 323 in the collection of the Petit Palais, Paris), a seated woman from the group *Supplication* (No. 227, Petit Palais), and the relief *Les pêcheurs* (No. 171, Petit Palais).

Dalou executed other models for the two sculpture groups destined to decorate the two corners of the Pont Alexandre III on the left bank of the Seine. One of these (No. 265, Petit Palais), reproduced in bronze by Hébrard, is similar to the ROM sketch, but it includes a full plinth as a base instead of the shallow slab of the ROM group.

The maquette acquired by the ROM is the first example of a work by Dalou to enter the permanent collection. It is a worthy addition to the European Department's small corpus of French bronzes of the 19th and early 20th century.

Terracotta relief of The Virgin and Child *by Giovanni Battista Foggini (1652–1725).*

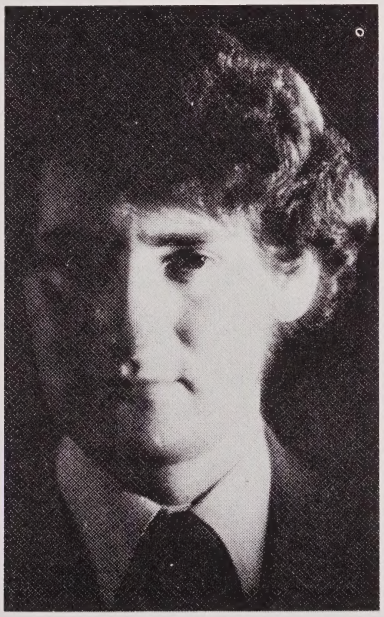
Very different in character from the Dalou maquette is the sleek and elegant group of *The Wrestlers*, a bronze reduction of one of the most famous of the Antique marbles in the Tribuna of the Uffizi in Florence. Devotees of the Florentine bronze will recognize this work as one which appeared on loan to the ROM in the 1975 exhibition *Florentine Baroque Bronzes and Other Objects of Art*, in which it was attributed to Giovanni Battista Foggini. The catalogue of the exhibition noted that in 1767 a group of *The Wrestlers* had been exhibited at the Florentine Academy under Foggini's name, and that the treatment of the base of the bronze now in the permanent collection of the ROM was not inconsistent with Foggini's work. The catalogue pointed out, however, that the rich, translucent gold patina of this bronze was more typical of the statuettes of Massimiliano Soldani-Benzi. The long, undulating, and rippling lines of the base, however, are also comparable with some Soldani bronzes and are paralleled to such a degree in works such as the Soldani *Lamentation* of c. 1715 (Walters Gallery, Baltimore), the *Venus and Amor* of c. 1695 (Ildebrando Bossi Collection, Genoa), and the *Venus and Adonis* of c. 1700 (Walters Gallery, Baltimore) that an attribution to Soldani appears entirely possible.

This is the second version of *The Wrestlers* to be acquired by the ROM; another version, purchased in the early 1960s has been on display in the European galleries for a number of years. The two groups, however, have little in common other than that their inspiration was drawn from the same classical marble. The group presented by Margaret and Ian Ross is a superlative example of the best traditions of the Florentine Baroque bronze—elegantly proportioned in spite of its sense of power and drama, highly detailed with fine and carefully controlled chiselling, and patinated with the typical rich and lustrous effect characteristic of Florentine Baroque bronzes that represented the culmination of a long tradition in this field extending back to the time of Giambologna.

The second gift of Margaret and Ian Ross was also displayed in the ROM's 1975 Baroque exhibition, although as it was a late addition to the show it was not illustrated in the catalogue. It is a terracotta relief of *The Virgin and Child* in clouds, surrounded by cherubim and angels, with a kneeling female figure below as a personification of the rule of the Medici. To the right are a bearded male river god symbolizing the Arno and a lion, the *Marzocco* of Florence, with Giotto's campanile and the dome of Sta Maria del Fiore rising up to dominate the skyline.

This oval terracotta is of considerable importance as it appears to be a sketch or model for the right-hand relief of the silver frontal or *paliotto* of the altar of the Madonna Chapel of the church of Sta Maria at Impruneta. Giovanni Battista Foggini, to whom the relief must be attributed, was in charge of the design for the frontal. Work on the project began shortly after 1711 and the final payment for the work was made in 1714. Charles Avery, who researched the terracotta for the ROM's 1975 exhibition, concluded that on the basis of existing documentation referring to the project the piece could be firmly dated to 1712 or 1713.

The relation of this terracotta to a known and documented Foggini commission makes it one of the most interesting and important sculptural works to be acquired by the European Department in recent years.



K. Corey Keeble is Assistant Curator in the European Department of the ROM. After receiving his undergraduate degree in English and history from United College (now the University of Winnipeg), he spent two years in England on postgraduate work at the Courtauld Institute of the University of London. Although interested in 15th- and 16th-century armour and German late Gothic panel painting, Mr. Keeble now concentrates his studies on Renaissance and Baroque bronze statuettes and terracottas. He is also working at present on Canadian stained glass, with Dr. Alice Hamilton of the University of Winnipeg.

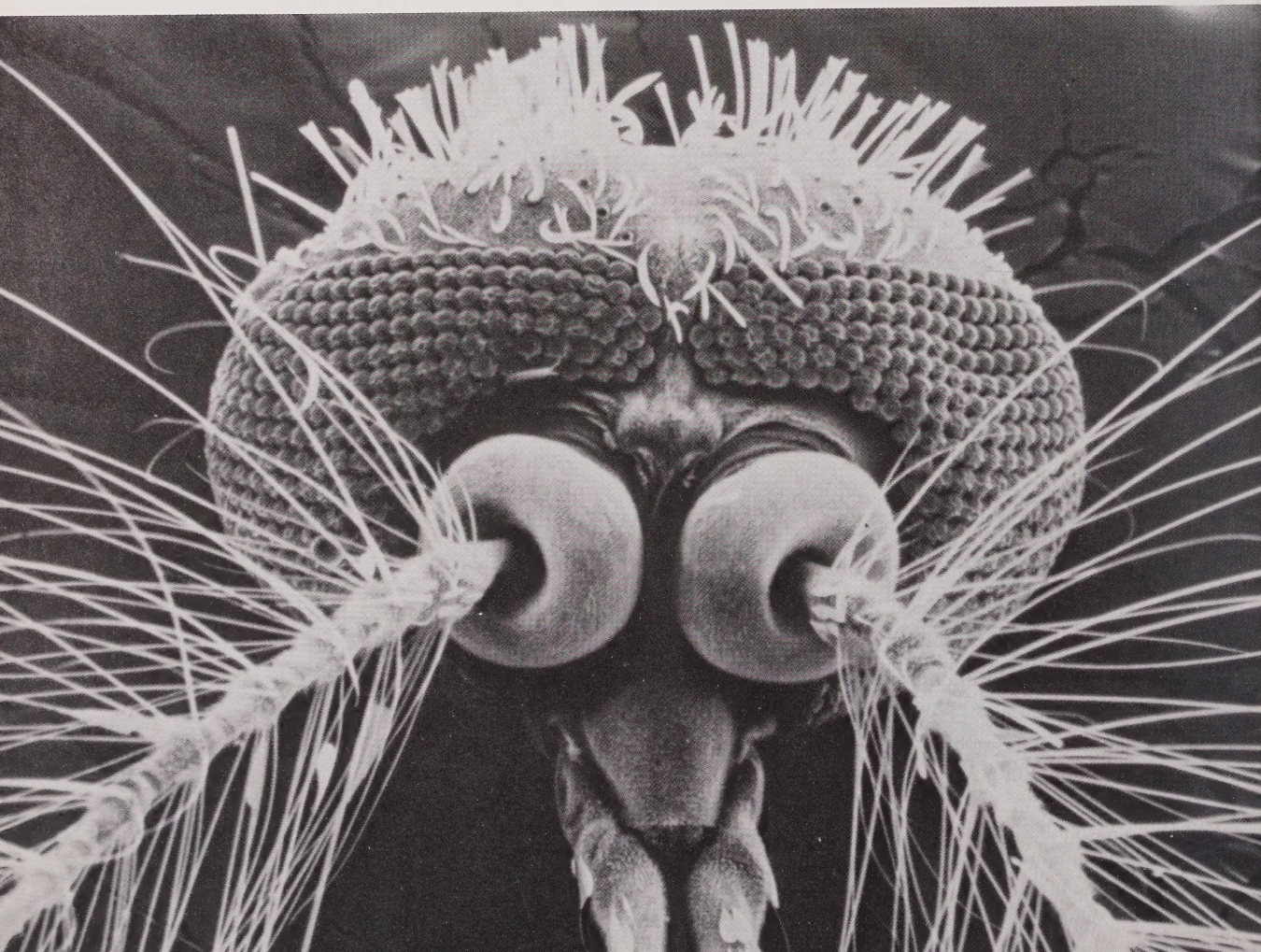
The Scanning Electron Microscope

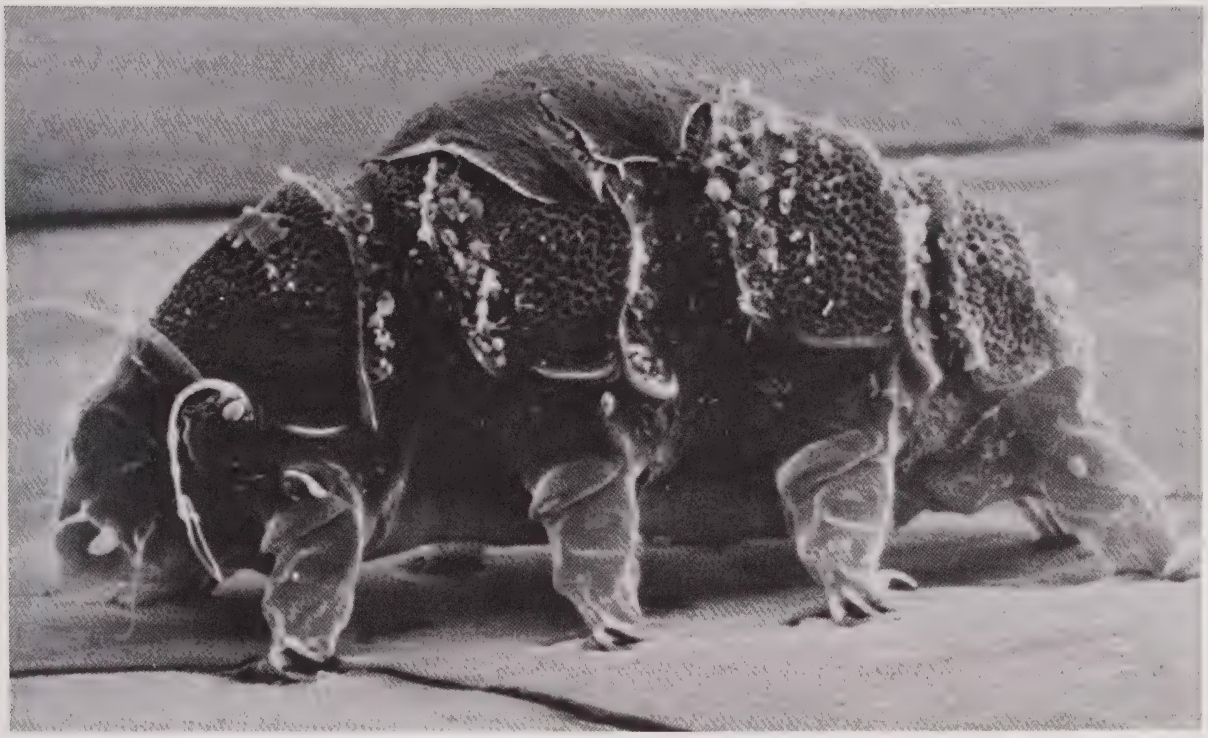
Janet Waddington

Discovering New Worlds

...and best of all,
the unknown, busy, very small
bugs that swim and bump and hop
inside a simple water drop.

Maxine Kumin, "The Microscope"





SINCE ITS INVENTION, the microscope has been the trademark of science—probably the single most useful tool ever invented. In 1610 a telescope enabled Galileo to describe for the first time the mountains of the moon, the rings of Saturn, and the first four satellites of Jupiter. Not content with visions of outer space, he turned his telescope around to view "inner space"—the microscopic world hitherto unexplored by the human eye. This step was to change the course of science.

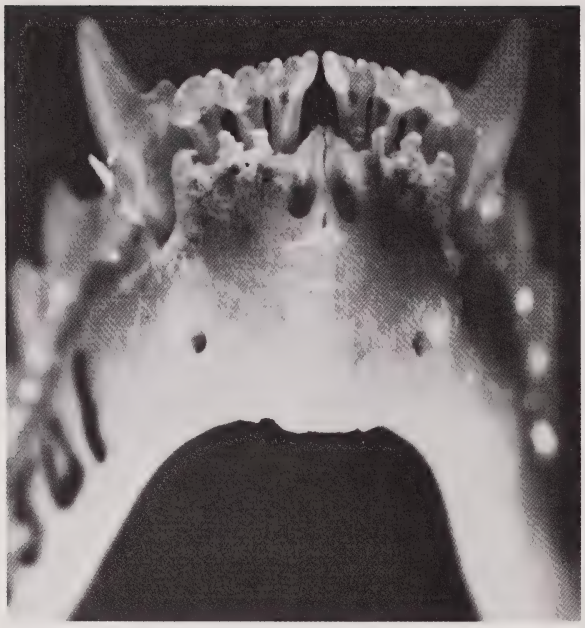
During the latter half of the 17th century, naturalists used the microscope to describe and explain a host of natural phenomena never before observed. An Italian, Marcello Malpighi, proved Harvey's ideas on circulation of the blood by actually observing and drawing the tiniest capillaries in the lungs of a frog. In Holland, Antony van Leeuwenhoek added to the understanding of blood with his discovery of blood corpuscles. Another Dutchman, Jan Swammerdam, produced finely detailed anatomical dissections of insects, including the mouth parts of the honey bee. In England, Robert Hooke documented the life cycle of the flea, thereby helping to dispel the popular belief that the "lower animals" formed spontaneously out of their habitats.

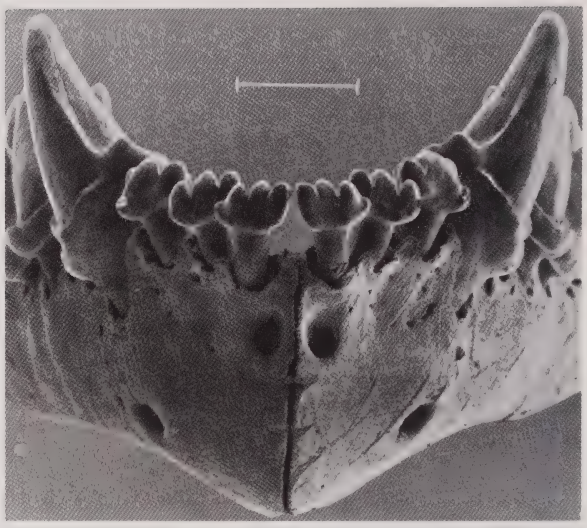
Van Leeuwenhoek and his colleagues worked with light or optical microscopes very similar to biological microscopes in use today. The object to be studied is illuminated by a bright light which reflects off its surface and then passes through a series of crystal or glass lenses to produce a magnified shape. For higher magnifications, the object must be very close to the initial or objective lens of the series. Light microscope studies also make use of transmitted light—a bright light is shone through a thin section of the specimen mounted on a glass slide.

Light microscopes today are very much better than those of van Leeuwenhoek's time, but their capabilities are ultimately limited by

Above: Tardigrades or water bears are an unusual group of microscopic animals found in a variety of aquatic and terrestrial habitats. They are cryptobiotic*—that is, they are able to shrivel up when conditions are too dry, and exist in a "mummified" state until the environment becomes moist again. In this cryptobiotic state, tardigrades are very resistant to heat and cold and have been known to become active again after as long as 20 years. The genus* Echiniscus*, pictured here, lives in mosses and lichens. It is uncertain whether tardigrades are more closely related to arthropods or to nematode worms (x 675).*

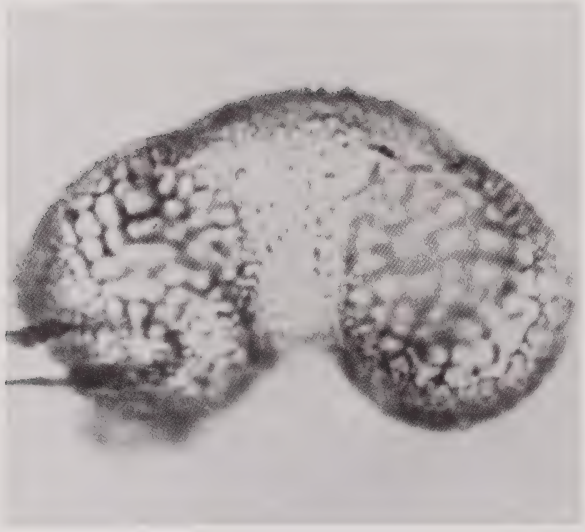
Opposite page: Eye to eye with a mosquito through the SEM (x 166).

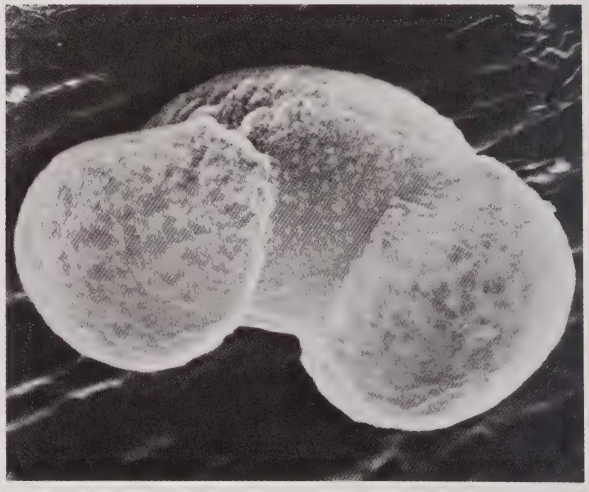




Above: The great depth of field available with the SEM makes it possible to magnify small objects with high relief, in perfect focus. These photographs show the jaw of the African bat Glauconycteris gleni *taken with a regular camera and close-up attachments (left) and using the SEM (right). The difference in depth of field obtainable with the two systems is obvious (left x 13; right x 16).*

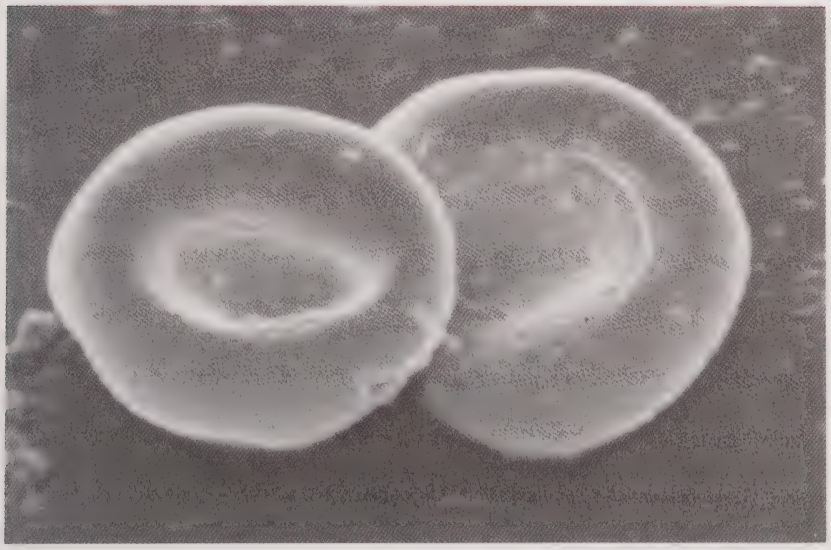
Below: Although it allows tiny objects to be viewed in three dimensions, the SEM cannot replace the conventional microscope; the two systems are complementary as these pictures illustrate. The pollen of pine has a three-lobed structure formed by two air bladders attached to the main body of the pollen grain. Under the optical microscope in transmitted light (left), a distinctive net-like pattern is visible on the bladders. A SEM view (right) reveals that this pattern is internal—the surface of the grain is smooth (both x 960).

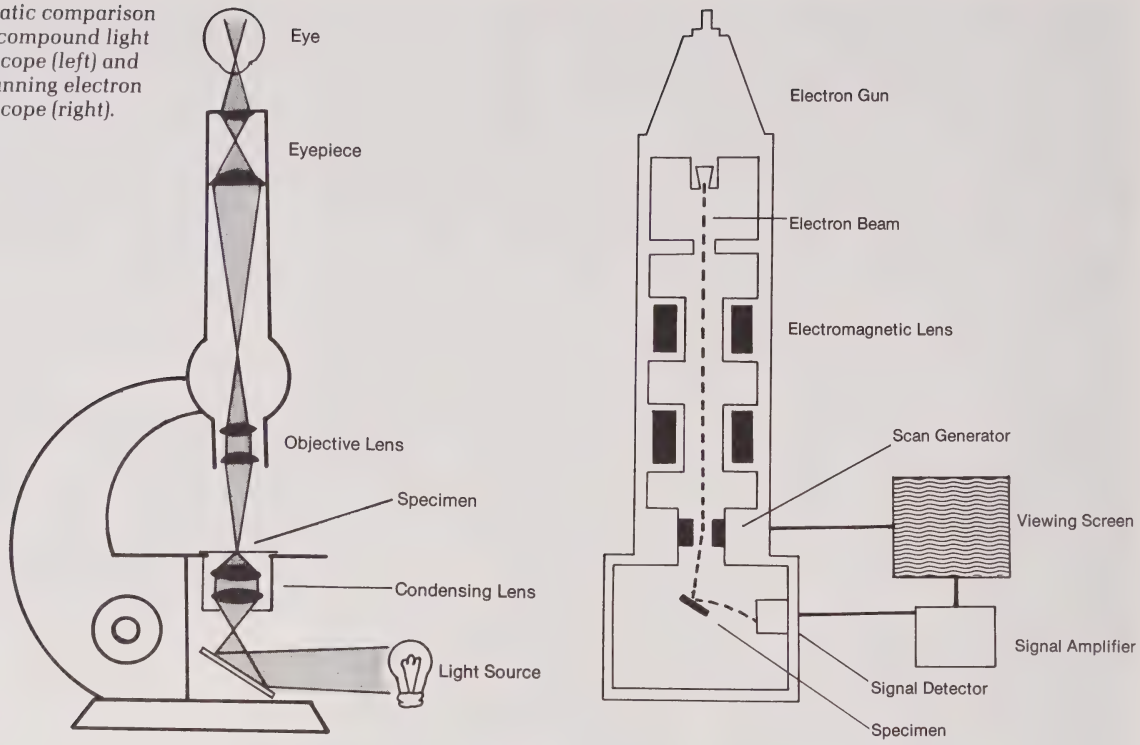




Top: In August, 1974, an international team of doctors performed an autopsy on the body of Nakht, a 16-year-old Egyptian boy who died in the 12th century B.C., about 3,200 years ago. Although frail and somewhat damaged, the desiccated body provided a great deal of information about conditions in the past. For example, Nakht suffered from anthracosis (carbon particles in the lungs) and had at least two types of serious parasitic infections.

Bottom: SEM investigation of Nakht's powder-dry tissues indicated that red blood cells had been preserved intact, so that blood-typing could be performed. (He was Group B.) This is the first time in history that the SEM has been employed to study mummified tissue (x 10,000).





Schematic comparison of the compound light microscope (left) and the scanning electron microscope (right).

the properties of light and of the materials from which the lenses are made. The transmission electron microscope (TEM), developed in the 1930s, surmounts some of these limitations. With the TEM, a beam of electrons is focused by electromagnets to pass through very thin slices of the object being studied to produce a flat image in the form of a shadow. The principles of the TEM are almost identical to those of an optical microscope employing transmitted light. During the mid-1960s, a new form of electron microscope, the scanning electron microscope (SEM), became available commercially. The SEM, like the TEM, employs an electron beam, but it produces three-dimensional images of the surfaces of objects at high magnifications, a feat never possible before with the light microscope. The SEM is revealing a three-dimensional world of tiny objects to today's microscopists.

In microscopy three important factors determine the quality and usefulness of the image produced. The most obvious is magnification. With the optical microscope, useful magnifications of up to 2,000 times are possible. With the SEM, magnifications of 20 to 50,000 times can be achieved.

As important as magnification is the resolving power, or resolution, of a microscope. This is the ability of the instrument to distinguish two points as being separate. The human eye can resolve points about 0.01 cm apart. The best optical microscope has a resolution of 0.00005 cm. Two points closer together than this will appear as one, and no amount of magnification can make them appear as two separate points. The SEM has a practical resolution of about 0.000001 cm. Thus a SEM image has 50 times the detail of a light microscope image at the same magnification. The resolving power is a function of the wavelength of the illuminating source, which cannot be altered within the microscope.

The third factor in microscopy is depth of field, which determines the portion of the object in focus at one time. With a light microscope at low magnifications, a large part of the object is in focus. However, one property of glass lenses is that increased magnification results in a decreased depth of field. Thus at higher magnifications the portion of an object that can be viewed at one time is progressively reduced until only a single plane is in focus. This makes it possible to view different levels in the same transparent specimen, but a total picture of the specimen must be reconstructed from a series of two-dimensional or planar images. With the SEM, depth of field is a constant property of the individual instrument and is theoretically independent of magnification. A depth of field characteristic of many SEMs is about 1 mm or 0.1 cm. Thus for many objects viewed with the SEM the depth of field is virtually limitless. The entire object may be viewed at one time in perfect focus, making interpretations much easier.

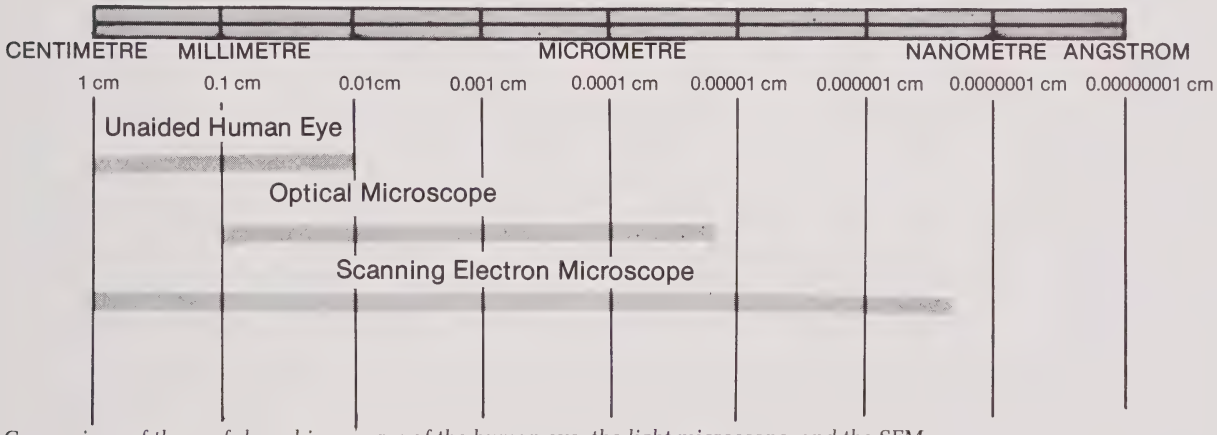
Preparation of a specimen for examination with the scanning electron microscope is quite simple. First the specimen is mounted on a metal stub about the size of a dime. Usually, if the specimen is a non-conductor as are most biological samples, a thin layer of metal, such as gold, is evaporated onto the specimen in a vacuum chamber. This helps to dissipate excess electrical

charges, which otherwise accumulate as the specimen is bombarded by the electron beam. Depending on the amount of detail required in the image, the coating may be from 50Å to 200Å thick (Å = 0.00000001 cm). The specimen on its stub is then placed in a chamber in the microscope and all the air is pumped out of the chamber. A beam of high energy electrons is focused by electromagnetic lenses to strike a single point on the object. Some of the electrons are scattered; others penetrate the sample, causing it to give off secondary electrons. The secondary electrons of a single energy level are picked up by a detector, modified through a signal amplifier, and expressed as a point of light on a cathode-ray viewing screen.

A picture of the object is built up by scanning the electron beam across it in a regular pattern to produce a corresponding image on the viewing screen, in the same way that a television picture is produced. The intensity of any spot on the image is determined by the relative position of the corresponding point on the specimen. If the electron beam strikes the surface at a high angle, much of its energy will be used in generating secondary electrons. At a low incident angle, the beam is partially reflected, and fewer secondary electrons are emitted. In this way contours are expressed by various degrees of brightness and shading, and an image of a three-dimensional surface is produced. Higher magnifications are achieved by concentrating the same scan pattern onto a smaller area of the object.

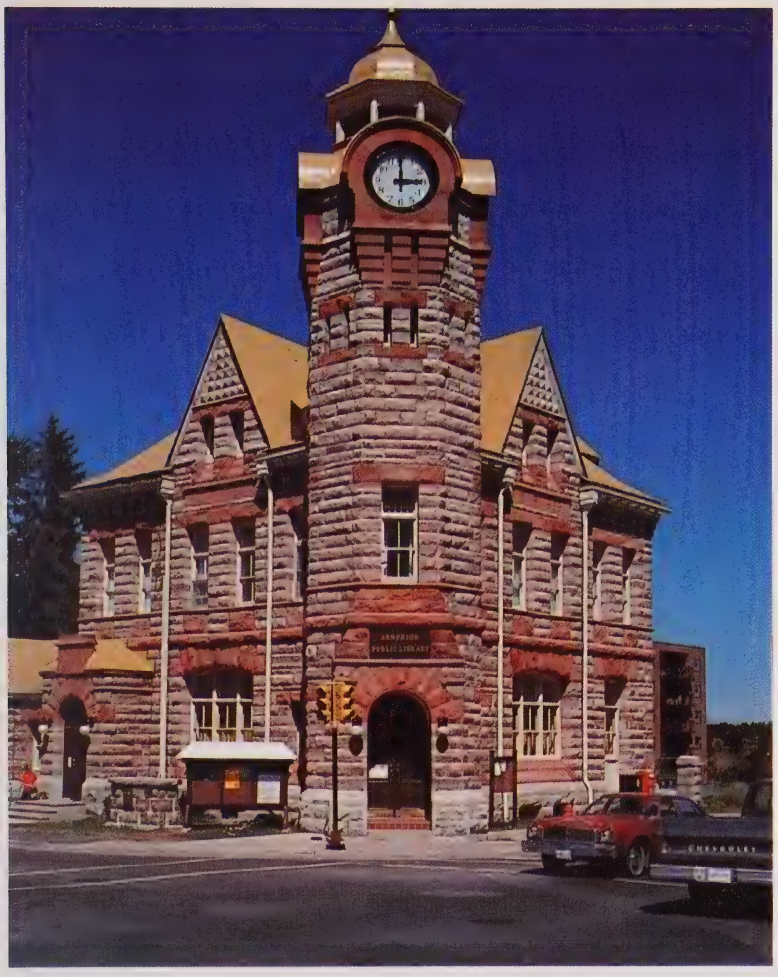
The scanning electron microscope has opened up vast new fields of research. It is being used to study the surface shape of cells to learn the effects of disease and malignancy. It can facilitate the identification of a species from a single hair or scale. It has made possible the verification of theoretical crystal structures. All in all, it is providing us with fascinating details of the microscopic world around us.

This article is an offshoot of a travelling exhibition of the same name developed in the summer of 1978 in conjunction with the 9th International Congress on Electron Microscopy, held in Toronto. Photographs and information were gathered from experts in many fields of research at the ROM and the University of Toronto. Much of the work was done on an instrument installed in the ROM in 1969 as part of a National Research Council Grant to the university's Department of Zoology. The facility is currently housed at the university, where a new, more sophisticated model was installed in 1977.



Comparison of the useful working ranges of the human eye, the light microscope, and the SEM.

Janet Waddington is a Curatorial Assistant in the Department of Invertebrate Palaeontology, with a B.Sc. in geology and an M.Sc. in invertebrate palaeontology from the University of Toronto. Since joining the ROM in 1971, her main objective has been the computerization of the fossil collections; she is a co-author of the recently published Catalogue of Type Invertebrate, Plant, and Trace Fossils in the Royal Ontario Museum, *which was produced by computer.*



Left: The Arnprior and District Museum is housed on the second floor of this fine old building, located in the centre of Arnprior.

Opposite page: An early telephone switchboard exhibited in the Black River-Matheson Museum, Matheson.

Beyond the City

Some Regional Museums of Northern Ontario

Walter M. Tovell and G. Ruth Tovell

HOW MANY OF US who live in large urban centres and have ready access to museums, art galleries, and other cultural institutions ever wonder about their numerous and more modest counterparts scattered throughout Ontario? In 1976, as part of the internal reorganization of the Royal Ontario Museum, a new department was formed—the Ontario Museums Support and Advisory Services (OMSAAS). It was charged with the task of advising on and, if possible, arranging for technical support which the ROM might be able to provide to small regional museums and related institutions in Ontario. Its services were to complement the work of the Museum Advisors of the provincial government. The first activities of the department were directed towards determining the geographic distribution of Ontario museums and at the same time making a study of the historical development of these institutions. Subsequently we would visit selected centres to view their facilities and collections and assess their technical requirements.

While the Ontario Ministry of Culture and Recreation issues a booklet entitled *Ontario Historic Sites, Museums, Galleries and Plaques*, data per-

taining to the distribution and development of museums in Ontario are to be found in an annual publication of the Canadian Museums Association entitled *Directory of Canadian Museums and Related Institutions.* The "related institutions" include art galleries, zoos, planetaria, historic houses, pioneer villages, some libraries, and some archives of governments, universities, religious orders, and private institutions. The total number of institutions listed for Ontario is about 460, of which some 145 are really "non-museum", but all are "culture and heritage" oriented. Nearly all the institutions mentioned sometimes approach the ROM for advice on loans, travelling exhibitions, preservation of materials, academic matters, and special local problems.

The diagram illustrating the cumulative percentage growth curve makes two deductions obvious. Fewer than 4 per cent (17) of the institutions were organized before 1900, and 50 per cent were organized in or after 1967—Canada's Centennial Year.

The oldest museum in Ontario—the Queen's University Geological Sciences Museum (Miller Hall) in Kingston—dates from 1841. One year later the National Museum of Natural Sciences was founded, coincidentally with the formation of the Geological Survey of Canada. However, as early as the 1830s Charles Fothergill, one-time King's Printer for Upper Canada, had had the intention of establishing a museum in York, which, according to Henry Scadding in *Toronto of Old,* was to be a "Museum of Natural and Civil History, with a Botanical and Zoological Garden attached; and a grant of land on the Government Reserve between the Garrison and Farr's Brewery was actually secured as a site for the buildings and grounds of the proposed institution". The Reserve was west of the present site of Trinity Bellwoods Park, which is situated on the north side of Queen Street West at Strachan Avenue.

The earliest developments of the small regional museums in Ontario are tied directly to the evolution of the Ontario Historical Society. According to Gerald Killan in his valuable study entitled *Preserving Ontario's Heritage,* the Society stipulated its aims regarding the collection of objects in a statement of intent in 1898. As well as pursuing its policy of uniting the various pioneer and historical societies, it planned "to publish volumes of Ontario history and begin a collections programme for the establishment of a library, museum, and archives for the province".

Through a combination of circumstances, the Ontario Historical Society failed in its principal aims, but it was indirectly responsible for the formation of the Archives of Ontario in 1903 and the Royal Ontario Museum in 1912. However, historical museums were established by affiliates of the Ontario Historical Society. By 1932 there were 15 small museums in operation, and between 1945 and 1957 some 25 more were established. All of them lacked facilities to render services to the public, and all of them were frustrated by lack of staff and funds. Therefore, in 1956, a museum section of the Ontario Historical Society was formed. Its stated purpose was "to ascertain the aims and desires of the museums of the Province, to establish standards, to exchange ideas, to disseminate information, and unite all in a fellowship of museum workers". Members of the staff of the Royal Ontario Museum were active in this movement, and eventually in 1971 individuals from the museum section of the Ontario Historical Society joined other museum workers to form the Ontario Museum Association.

For the second phase of the OMSAAS programme, it was decided to survey as many museums as possible in northern Ontario, the eastern part of Manitoulin Island, and the Ottawa Valley. These regions were selected partly because of the personal contacts that had already been established, partly because of requests the ROM had re-

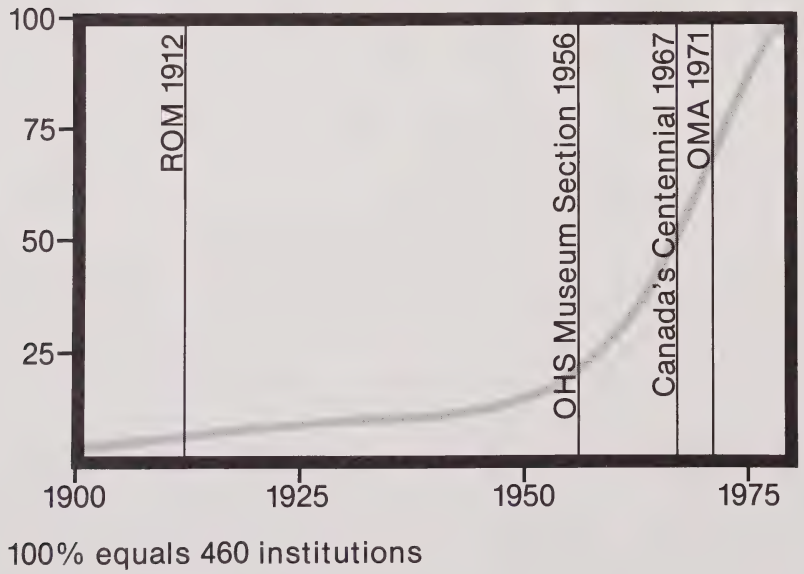
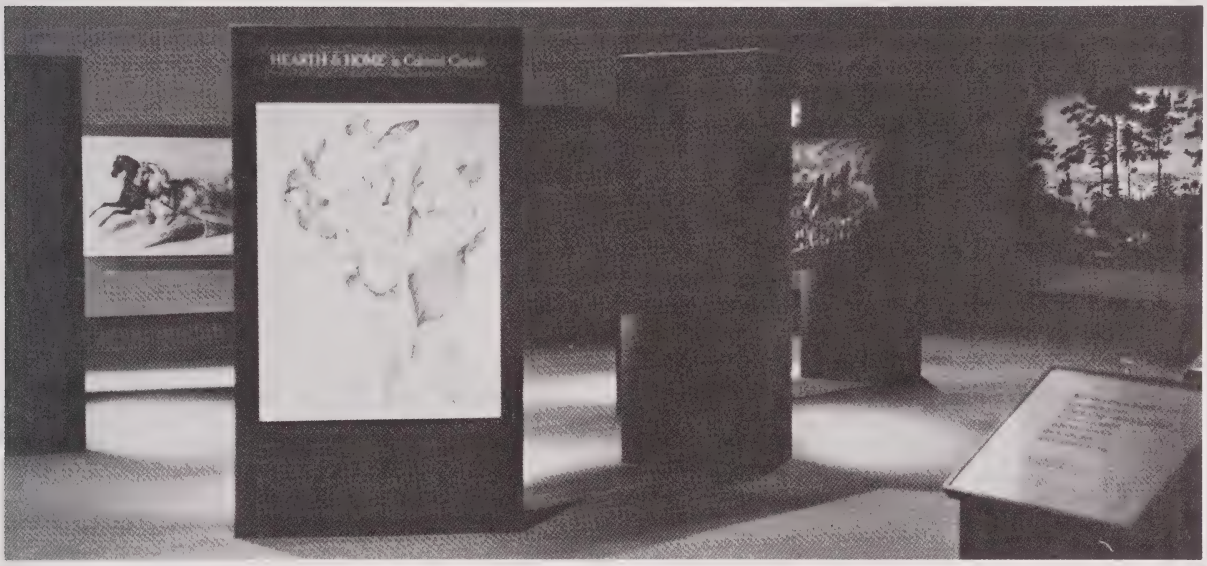


Diagram showing the percentage growth curve of Ontario cultural institutions since the beginning of the century.



Two views of the ROM *travelling exhibition* Hearth & Home in Colonial Canada *on display in the Thunder Bay National Exhibition Centre.*

ceived for advice and exhibitions, but mainly because the remoteness of the institutions made it difficult for them to have direct access to the ROM.

The buildings that house the collections of the museums we have visited vary from vacated municipal buildings such as registry offices (the Thunder Bay Historical Museum Society) to steel sheds (the Paipoonge Museum, west of Thunder Bay). At Renfrew the McDougall Mill Museum is housed in an old mill, while the Arnprior and District Museum comprises the second floor of a very fine stone municipal building. Other museums are accommodated in surplus school houses—the Black River-Matheson Museum, the Tehkummah Township Museum (Little Red Schoolhouse Museum) in South Baymouth, Manitoulin Island, and part of the complex of the St. Joseph Island Museum. The Iroquois Falls Pioneer Museum is located in the unused baggage room of the Ontario Northland Railway Station, while the Kapuskasing Public Historical Museum and the Cochrane Railway and Pioneer Museum are housed in railway cars.

Many of the museums we visited were exploring the possibilities of expansion, since all of them find their quarters cramped. The most ambitious plan is that of the Lake of the Woods Museum, which hopes to move into the old Post Office Building, a large structure located in the heart of Kenora. The goal of the Dryden and District Museum, housed at present in part of the Chamber of Commerce building, is to have an addition made to the premises for its sole use.

Of special interest to us was the Fort Frances Museum; it had a small exhibit in the public library, but most of its holdings were displayed in a forestry fire tower. Now, however, the museum occupies new premises in a former school building on the main street. Shared by the museum with other cultural groups, the site is known as the Fort Frances Museum and Recreational Cultural Centre. The plans and modifications to the building required for the museum area were drawn up initially on the basis of in-depth discussions with OMSAAS.

Most of the museums are administered by municipal governments and operated by boards consisting of

Above: Two hand-carved models of early logging equipment in the Blind River Timber Village Museum. At the top left is a "crazy wheel", used to ease heavy loads down a slope.

Right: Exhibits in the Bruce Mines Museum.

Opposite page: The Cochrane Railway and Pioneer Museum is housed in this train.

The ROM... a unique resource for Canada and the world

James E. Cruise
Director

In the course of its 67-year history, millions of visitors have toured the galleries of the imposing grey limestone building at the corner of Bloor Street and Queen's Park—known as the Royal Ontario Museum. They come to admire and study its outstanding collections, so interestingly and effectively displayed. But not many of these visitors realize that the ROM (as we affectionately call it) is one of the great museums of the world. Among North American institutions it is unique in housing under one roof 20 separate curatorial departments, which encompass the disciplines both of the sciences and of art and archaeology—Botany, Entomology, Ichthyology and Herpetology, Invertebrate Palaeontology, Invertebrate Zoology, Mammalogy, Mineralogy and Geology, Ornithology, Planetarium, Vertebrate Palaeontology, Canadiana, Egyptian, Ethnology, European, Far Eastern, Greek and Roman, New World Archaeology, Philately, Textiles, and West Asian.

The ROM has had the great fortune over the years to amass magnificent, world-famous collections—more than 6,000,000 artifacts and specimens, whose value is conservatively estimated in hundreds of millions of dollars. What cannot be estimated is the worth of its dedicated staff of world-rank scholars, scientists, and archaeologists, the equivalent of the staff of a small university, doing basic research on topics as diverse as the evolution of African Molossid bat species and details of Roman and Pre-Roman glass in the Museum's own collections.

While the material collections are priceless, it is the collection of human knowledge and skills that makes the ROM a world-class museum—research scholars who contribute annually to the body of total knowledge in many disciplines, educators who are renowned in their fields, outstanding designers, artists, and photographers.

Situated in Toronto and an integral part of Toronto's history and civic pride, as well as a major tourist resource, the Royal Ontario Museum is a national and worldwide educational, historical, and cultural resource. Although it belongs to the people of Canada, it is a kaleidoscope of man's history and perhaps of his future.

What the ROM means to Ontario...

The scholars and scientists of the ROM are very active in teaching both graduate and undergraduate courses at Ontario universities . . . at community colleges within commuting distance of Toronto . . . and at the Ontario College of Art.

Each year some 160,000 students from Ontario schools—and from other provinces as well, and even some from the United States—visit the ROM to participate in gallery lessons conducted either by their own teachers or by teachers of the Education Department. In addition, more than 60,000 students take advantage of the school programmes offered at the McLaughlin Planetarium.

Educational outreach to Ontario schools is a major function of the Extension Department. School cases of artifacts and specimens are available for a wide range of disciplines. Moreover, the ROM organizes and distributes an entire spectrum of travelling exhibits, many of which are displayed at the ROM before moving on to other museums, libraries, and other public places in Ontario and throughout Canada. A recent exhibit of textiles, *Toiles de Jouy*, was sent first to Jouy en Josas in France and later to seven regional museums in Quebec, before coming home again to the ROM.

Two ROM Museumobiles—*Fossils in Ontario* and *Man in Ontario*—travel many thousands of miles each year to visit remote communities of northern Ontario during the summer months.

The Speakers' Bureau, with an extensive roster of staff members and volunteers, provides speakers for study groups, library and service groups, historical societies, and collectors' associations.

The ROM staff at work . . .

The ROM internationally...

The ROM has long been renowned for the endeavours of its scientists and archaeological staff in more than 20 countries throughout the world. In fact, their work is probably better known in other countries than in Canada.

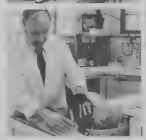
The ROM policy of international curatorial loans of outstanding artifacts and specimens has won us many friends in the international museum community. A recent example was the request from Japan that the National Museum of Nara, Japan, be lent four of our unique Chinese sculptures for a particularly important exhibition of early East Asian Buddhist art.

The curators of the ROM are actively involved in a wide variety of national and international professional organizations in their own disciplines, as well as in museum organizations worldwide.

The need for more space at the ROM...

For some 20 years, with the growth of staff and collections at the ROM, we have been gradually becoming more and more crowded. Now three major buildings—the original ROM building, the Planetarium, and the Canadiana Building—along with some seven off-site quarters are needed to house us. The encroachment on gallery space means that only about 5 per cent of the ROM's magnificent collections are available for public viewing.

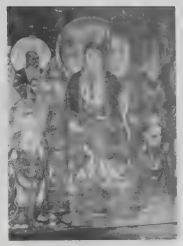
In 1974 the Board of Trustees determined that there must be more space. Consequently, a major study was commissioned. It encompassed the views of more than 1,700 parents, teachers, students, interested citizens, and boards of education, and it provided valuable information as to what the citizens of Ontario want in their ROM. The decision was that the space for public galleries should be substantially increased . . . and that this should be done only after sufficient study and planning to make the new and expanded ROM a collection of the best museum galleries that could be conceived and produced.



The ROM staff at work . . .

The new ROM...

Five levels of new galleries in a terrace sweeping up from a small park on Bloor Street will change the face of the ROM and keep it an exciting world-class public museum until well into the 21st century. In accordance with the detailed planning of a group of museum specialists, the new ROM will have almost half again as much display space as in the present public galleries. What's more, it will incorporate innovative ideas in museum display. The Renovation/Expansion is providing the opportunity for the ROM to employ an entirely new concept in the arrangement of museum galleries—the grouping of galleries into conceptually related clusters. The present galleries, divided up among 20 departments, will be replaced by 7 clusters of integrated galleries, each of which will make a comprehensive statement.



- The Rotunda will continue to be the main Museum entrance—with a new major Exhibition Hall for short-term exhibitions adjoining it on the left. This hall will have a special "skin within the skin" of the building walls to give it the degree of environmental control required by the large international travelling exhibitions
- The atrium next to Exhibition Hall will contain an access ramp to the Planetarium galleries, which will be in the McLaughlin Planetarium building.
- The first gallery the visitor will see directly off the Rotunda will be a major new gallery—Mankind Discovering. This gallery will serve as an orientation and introduction to the Museum and will make a comprehensive statement of the Museum's theme.
- The Far Eastern cluster—with 16 galleries—will also be on the first floor and will include Terrace Gallery space, part of the northwest wing, and the two atrium areas flanking the Terrace. The Ming Tomb and the Chinese wall paintings will finally become integral parts of the Far Eastern cluster, after some 50 years of separation.
- The Earth Sciences cluster will be situated on the first floor in the southwest wing and in the adjacent atrium.
- The Life and Palaeontological Sciences—with a large interdisciplinary gallery and a series of departmental galleries—will occupy the entire second floor.
- The third floor will contain the Ancient World cluster and a large part of the European galleries—with a conceptual link between them provided by continuing the chronological presentation of the Ancient World into the medieval displays of the European Department.
- The first lower level will house the New World cluster. This will include galleries devoted to Great Lakes archaeology and ethnological galleries on the Native peoples of the New World.
- In the west portion of this level of the Terrace galleries, a Europe/Canada cluster, including some special European collections, some new Canadiana galleries, and some Textile galleries, will be housed.
- The Discovery Room and a children's participation area will be located on the second lower level.

The cost of the new ROM...

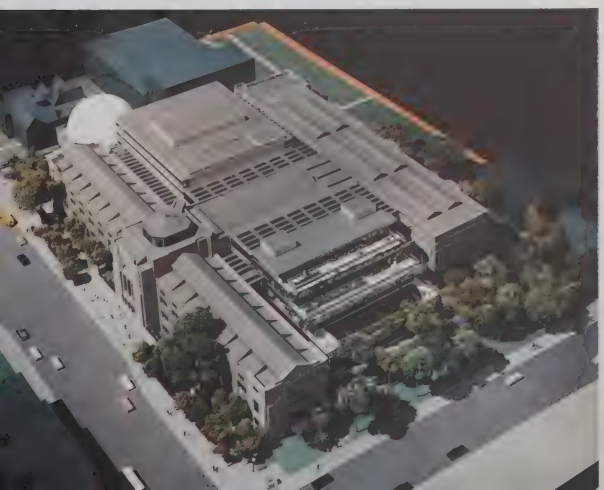
Renovation/Expansion costs will be very high; we expect that the total will exceed $50 million (in 1978 dollars).

While we hope that a major portion of this investment in the future of the ROM will be borne by governments at all levels, we are currently seeking funds from the public and from friends of the ROM. The target of the ROM Renovation/Expansion Fund Campaign is $10 million, which will be matched—up to a total of $10.3 million—by Wintario.

At the time of writing more than $5 million has either been donated or pledged. A large Campaign Team, headed by Co-Chairmen Mrs. K.L. Campbell and Mr. John Devlin, is hard at work seeking gifts and pledges that will put us over the top.

We want and we need *your* financial support for the ROM.

Gifts and pledges will be tax deductible for Canadian donors, and pledges may be extended over a five-year period.



ROM

How you can help the ROM

Send your pledges or gifts to

The ROM Renovation/Expansion Fund Campaign

The Royal Ontario Museum
100 Queen's Park
Toronto, Canada M5S 2C6

Donors will receive a tax receipt under Canada Registration No. 0337105-50-13

AND YOUR GIFT WILL BE MATCHED BY A GRANT FROM WINTARIO

Photographs of architects' models and artist's impression of renovated, expanded ROM by Panda Associates.

March 1979

some elected members and some appointed members. Other institutions are run by non-profit organizations. Among the latter group is the Thunder Bay Historical Museum Society, probably the most successful museum in northern Ontario to date. Although the Thunder Bay Historical Society was founded in 1908 and has had a continuous record of publication, the museum was not officially opened until 1942. The Thunder Bay Historical Museum Society also operates a National Exhibition Centre, which opened in 1975. The ROM provided one of its first exhibitions—the travelling exhibit *Hearth and Home in Colonial Canada*—and has provided others since that time.

The Timmins Museum: National Exhibition Centre offers an interesting contrast to the one in Thunder Bay. It began as a National Exhibition Centre in 1975, and now it is adding 2,000 square metres to its original floor space. The ROM has been asked to assist in this venture, particularly in the installation of a very good mineral collection that at present is housed elsewhere in the community.

Most of the regional museums are open only in the summer, usually from about May 1 to September 30. However, virtually all of them will arrange for special visits on request. Institutions with permanent staff, such as those at Thunder Bay, Timmins, and Kenora, are open the year round.

Generally the larger institutions and the National Exhibition Centres have good security, but only in the Exhibition Centres is the climate control considered to be up to standard. As well as providing a setting for travelling exhibitions from national, provincial, and private organizations, some of these institutions are used for activities of ethnic and cultural groups in the community.

The collections displayed in the museums we have visited have a great many features in common. In a general way they can be grouped into: 1) archaeological and ethnographic collections; 2) objects relating to material culture, including those used in homesteads, community development, and merchandising; 3) objects relating to industries in the community, for example, forestry; and 4) archival documents—photographic records, deeds, plans, and/or newspapers. As well as all the things mentioned, the Arnprior and District Museum has an exhibit showing the distribution of fossil whales in the Ottawa Valley. It is the only museum we have visited that features a natural history exhibit.

The strengths of the various collections vary from institution to institution. Probably the best ethnographic collection is to be found in the Lake of the Woods Museum, which has acquired and displays excellent examples of garments and crafts, primarily of Ojibwa origin. The best archaeological collection we have seen is in the Thunder Bay Museum, where artifacts of an early

A replica of an early general store in the Arnprior and District Museum.

copper culture are exhibited.

Material associated with pioneer life is always local, so that what is displayed in Pembroke, for example, pertains only to the Pembroke area, and what is displayed in Fort Frances, only to the Fort Frances area. Among the many artifacts, a few that caught our eyes were some of the earliest telephones and switchboards ever installed, a working early gramophone that played wax cylinders instead of records, and handmade washing machines.

Industrial artifacts usually relate to local industries, and virtually all the museums feature early tools of the trade that was common to most northern Ontario regions—forestry. Some of the best material is to be found in the Timber Village Museum in Blind River—one of its prized holdings is a large stove-kettle used in winter to heat the mash for the horses in the lumber camps. This museum also undertook an interesting experiment to bring to life the early days of lumbering in the community. An elderly man who had worked in the bush camps came to the museum at regular times during the day to chat with visitors and relate his experiences. An excellent set of models depicting the techniques of lumbering, including a "crazy wheel", was set up in the museum.

The lumbering displays in all the museums of northern Ontario give the visitor an insight into the history of this all-important industry based on a natural resource. Unfortunately, no comparable amount of material is exhibited to feature the mining industry. It is a pity that good mineral and rock collections are not to be found in any museum we have visited, especially in view of the fact that so many mineral collectors comb the outcrops of the Canadian Shield each summer in pursuit of their hobby.

However, the museum in Thunder Bay has a good exhibit depicting events at the famous Silver Islet mine, which produced $3,250,000 worth of silver ore between 1868 and 1884. The staff of the museum has also put together a tape-slide presentation based on photographs

of this exceptionally interesting mining development on this island at the foot of the Sibley Peninsula.

Archival material often highlights the work of the individuals who built communities round the forestry industry, for example, the Matthews at Fort Frances and the McFaddens at Blind River. Some of the photographic material in the collections is unique. One exceptional set of photographs to be found in the Lake of the Woods Museum documents the history of the building of the CPR in northwestern Ontario.

All museums have collections of textiles—mainly costumes and military uniforms—chinaware, and household articles of one kind and another. With the Ontario government's programme of cataloguing holdings in the regional museums, an inventory of the material of the collections is being built up, but precise documentation is usually lacking.

Many museums we visited have pleasing presentations. Of particular note are the Cochrane Railway and Pioneer Museum and the Black River-Matheson Museum. In the former, the exhibits have been fitted tastefully into railway cars—a pioneer cabin and a trapper's cabin have been reduced to scale and yet they appear realistic. In the Black River-Matheson Museum the exhibits are organized in such a way that the visitor is able to get a complete picture of the growth of the community the museum represents.

The museums in our selected survey areas are staffed by interesting, enthusiastic, and above all dedicated people, most of them volunteers. They are well aware of the many problems faced by the institutions they serve so well. The assistance provided them so far by OMSAAS has complemented that offered by the Ontario Ministry of Culture and Recreation and the training programmes of the Canadian Museums Association and the Ontario Museum Association. Principally, OMSAAS efforts have provided a basis for discussions between the ROM and the smaller museums and have demonstrated to the museums the possibilities for technical guidance and support—both direct and moral.

Most of the museums in northern Ontario, Manitoulin Island, and the Ottawa Valley are first-generation museums, many of them formed in Canada's Centennial Year. They have collected and exhibit objects associated with their local histories. They are expressions of the heritage movement, based to a large extent on nostalgia and an "urge to perpetuate the traditions of past generations". The heritage movement underlines the fact that peoples' roots are in their past environments, and plans for the future must recognize this fact. "He who looks not back loses his way." Museums, no matter how small, mirror the past in a way that cannot be accomplished by any other means. They are important today—and will be even more important tomorrow.

Dr. Walter M. Tovell is Head of the ROM's Ontario Museums Support and Advisory Services. Assisted by his wife Ruth, Dr. Tovell has travelled more than 3,500 miles by car and trailer to survey regional museums throughout Ontario. Several of the institutions have received advice and technical support. The Tovells' experiences have helped to promote an understanding of the important role that local museums play in their communities.

CANADIAN GEOGRAPHIC TO FEATURE THE ROM

A major pictorial feature on the ROM, with supporting text, will be published in the April/May issue of the *Canadian Geographic*. The pictorial aspect will attempt to give readers the feeling of exploring the museum. The text will bring out many details of human interest. Copies of the magazine are sold on principal newsstands in the leading cities.

CORRECTIONS TO RECENT PUBLICATIONS

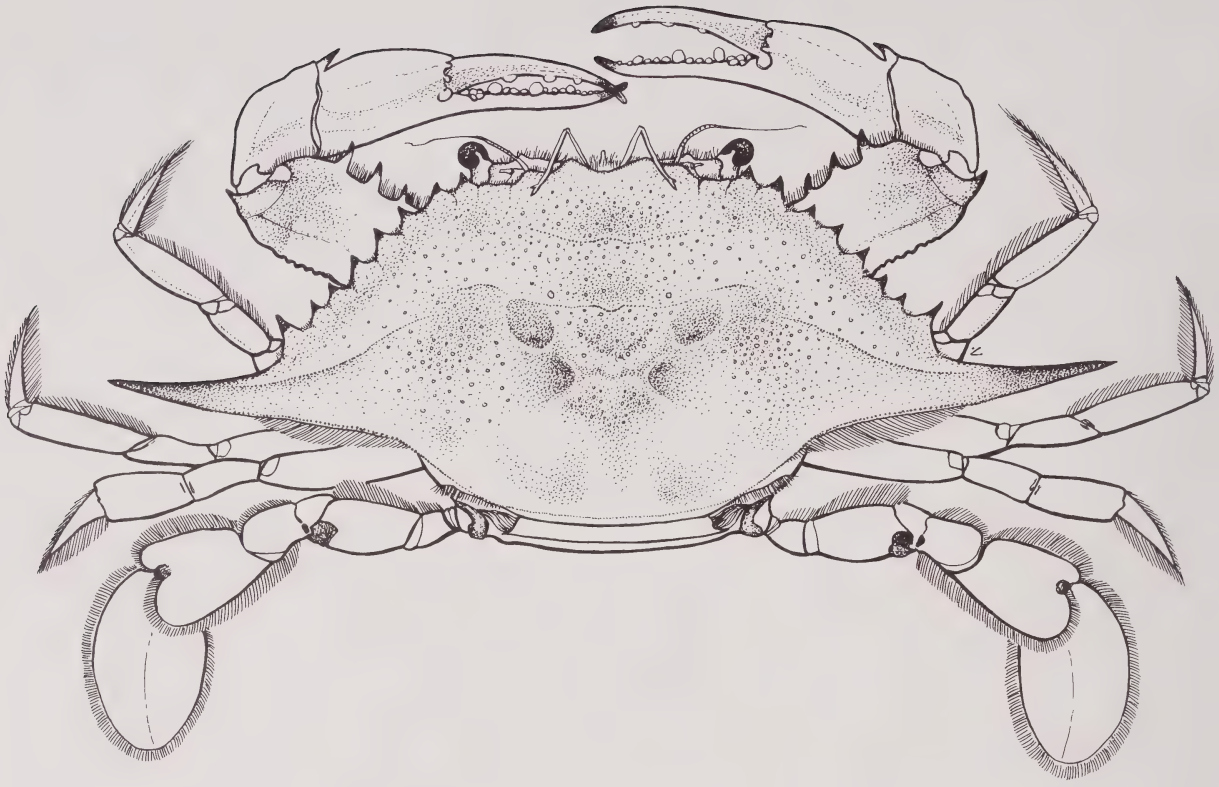
Edu-Colour Book 703: Egypt, text by *N.B. Millet,* drawings by *Julian Mulock,* ROM, $1.25 paper

Edu-Colour Book 704: Native Peoples of North America, text by *Richard Daly,* drawings by *Julian Mulock,* ROM, $1.25 paper

ONE OF TORONTO'S GREAT CHARMS lies in the many colourful markets to be found in different parts of the city. At the Kensington Market, for example, the names of the fish shops—Portuguese Fish Market, International Fish Market, New Seaway Fish Market, Canadian Fish Market, Esthela's—are as varied as the vendors, the shoppers, and the merchandise. Most of the stands, however, have one thing in common: among the items they offer for sale are crustaceans and molluscs from all over the world. One can find crabs from Alaska, the Maritimes, Cuba, Mozambique, and Honduras; clams, mussels, and oysters from the east coast of the United States and Canada; octopuses from Taiwan and other lands; and squid from Portugal.

One day my assistants and I bought crabs, clams, oysters, and mussels from the Canadian east coast; shrimps from Alaska and Norway; squid from Portugal; periwinkles and a large octopus from unknown localities; and a lobster. That evening, with the boiled animals spread out in front of us on a platter, we had to admire the medley of gay colours, odd shapes, and varied sizes. The greenish-brown lobster had turned *as red as a lobster;* the blue crabs were now an orange-red; the shrimps and prawns lay in a sprawling tangle of intertwined limbs; the clams and mussels had opened partially in the steam; and the diminutive periwinkle was dwarfed by the octopus. Why, I wondered, do we eat only the flesh from the claw of the lobster, from the tail of the shrimp and the lobster, and from the cephalothorax (fused head and thorax) of the crab?

Crabs, shrimps, and lobsters are crustaceans whose segmented soft body parts are enclosed in an external skeleton or exoskeleton. Frontally the segments lie hidden in the fused cephalothorax. On the abdomen the segments are visible since each one is covered by a separate skeletal plate. This makes the abdomen flexible and enables the animal to move more easily. Along the sides of the body there are jointed limbs, which drop off if the animal is trapped or injured; later new limbs will regenerate. (The reason the lobster turns red when it is boiled



is that the hidden carotene pigment in the skeleton becomes visible when the chemical bond that tied the pigment to a protein is destroyed.) The skeleton of the crab and the lobster is strong; it keeps the animal well protected and provides it with mechanical support. However, the skeleton presents certain drawbacks as well: it is heavy and rigid and impedes the animal's movement, and it necessitates moulting followed by the growth of a larger exoskeleton to accommodate the growing soft parts. When the animal is moulting, it is vulnerable to attack. Moreover, the exoskeleton often forms a barrier to mating. In the Dungeness crab, the male moults at a different time from the female. Before she moults, he intimates his intentions by stroking her abdomen. After she has shed her exoskeleton, he retreats temporarily and waits until her new skeleton has hardened slightly. Only then can mating proceed.

Crabs and lobsters are caught in baited traps. Since they spend most of their lives walking on the bottom of the sea, anything that has eyes and swims above them is quite likely to spot them. But crabs and lobsters have their own protection. The calcified skeleton contains chromatophores, which are centres of concentrated pigment. As the animals move over the mud bottom, their colour changes to blend with the variations in colour tone of the bottom. They have claws too, which serve a dual purpose. They are used for hunting and gathering food and as weapons to ward off other creatures. Some crabs use their claws to communicate—to indicate the boundaries of their territory, or to show that they are ready to fight or to mate. Most restaurants provide crackers to help remove the tough cover from the lobster claws. If you have ever had trouble opening a lobster claw, be grateful that you are not its prey. The flesh that you are seeking is the powerful muscle that closes the pincer at the tip. The larger claw is used extensively for crushing shells and small crustaceans and the smaller one has a serrated cutting edge.

It seems that with all crustaceans we eat the flesh from the parts of the body that during life were subject to the most rigorous exercise. We eat the lobster tail because when the lobster swims, its abdomen pushes the weight of the cephalothorax, and until her eggs are hatched, the female carries them on the swimming limbs attached to the side of her abdomen. Crabs for the most part run sideways on their walking legs. Both walking and swimming limbs are operated by the muscles in the cephalothorax, which supply the edible crab meat.

Shrimps and prawns, which also have claws, are caught in nets since they spend their adult lives swimming at midwater level. They swim with paddle-shaped limbs, attached laterally to the segments beneath the abdominal plates; abdominal movement helps to propel them in various directions. The Alaska shrimp car-

ries her eggs under the pleural cover on the side of her abdomen. After the eggs are fertilized, they remain attached to the swimming limbs until they hatch. The shrimp's abdominal muscles are strong and juicy, and they are the only part of the shrimp we eat.

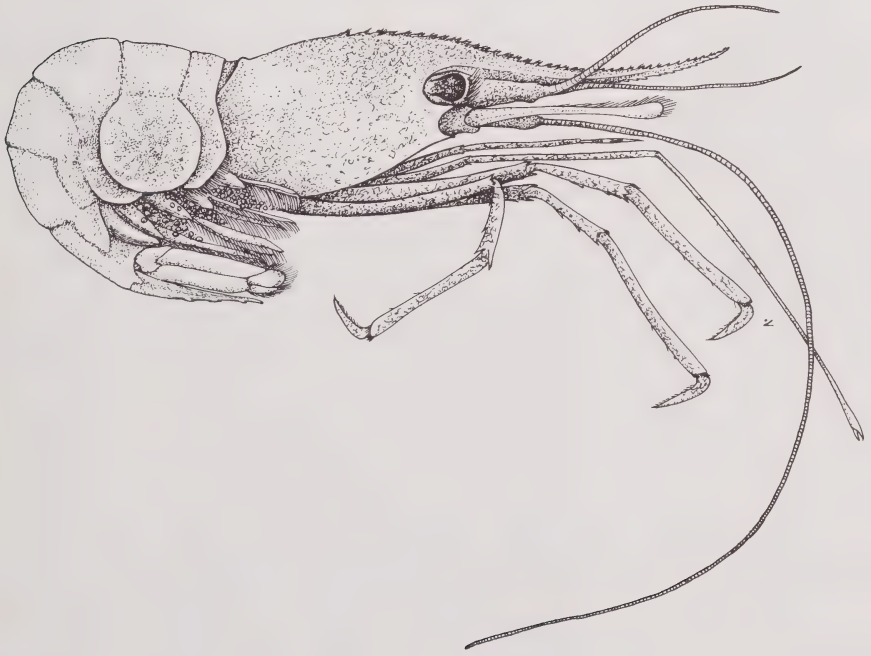
Though the molluscs we find in a fish market are commonly called shellfish, they are not fish at all since they lack an internal backbone and fins with skeletal support. The main constituent of the shell is calcium carbonate, and the thickness or texture of the shell tells us something about the bottom where the animal lived. Clams, mussels, and oysters are bivalves; their shell is made up of two valves, which are kept closed by powerful adductor muscles. It is these muscles that provide the best parts of the molluscs for eating, and as anyone who has tried shucking clams for chowder knows, they are very strong. It is extremely hard to get a knife inside the shell to sever the muscles and separate the valves.

Oysters are often associated with the precious pearl found in the pearl oyster, but edible oysters, like the American oyster, are noted for their delicious taste. They are eaten whole (except for the shell, of course). Since oysters are prone to disease, those we purchase in fish markets have been carefully screened by commercial growers and inspected before they are released for sale.

Oysters live in shallow water, and they open their valves by means of a ligament and close them by means of the adductor muscle, located some distance from the hingeline inside the shell. Before the young oyster settles, usually on pilings, rocks, or the shallow sea bottom, it pours cement from a gland in the foot onto the substrate, and then fixes itself horizontally. There the oyster stays for the rest of its life, or until an oysterman comes along and picks it off with a pair of oyster tongs. Nowadays oysters are often collected with long iron rakes, and commercial oystermen use dredges.

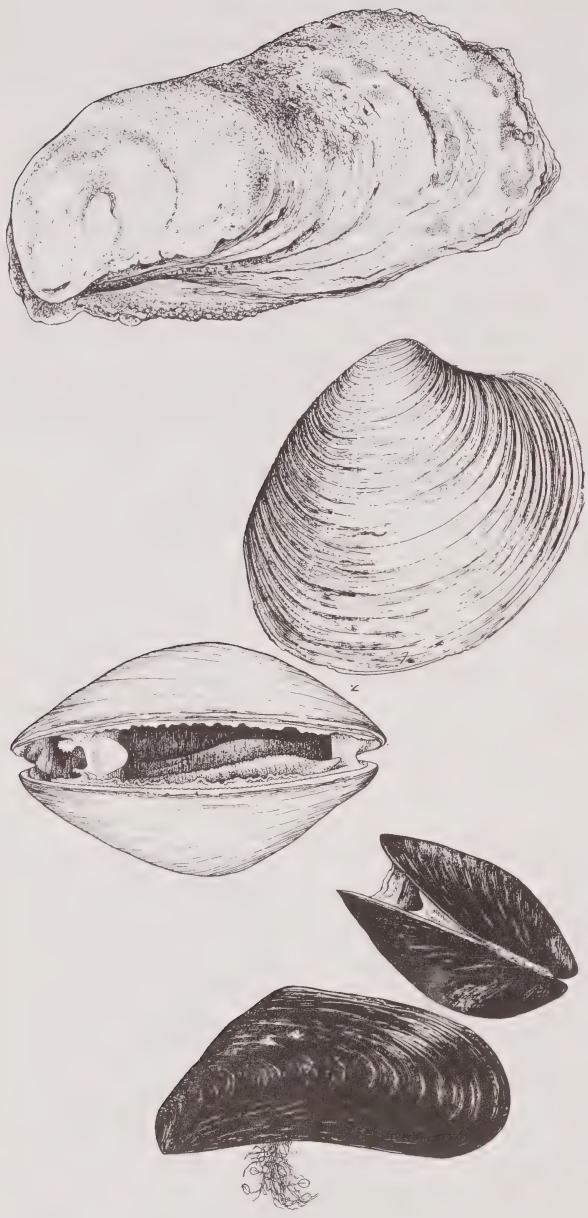
The oyster shell is very thick, and its valves are asymmetrical: the attached valve is convex and the free valve is flat. The shell builds up from flaky layers and each layer represents a different period of growth. The smallest layer is the oldest, the largest layer the most recent. Oysters have a tendency to change sex during their lives, starting out as males and turning into females. This change can occur once or several times during a lifespan, but most oysters end up as females, and they can live to be 20 years old.

Clams live buried in mud and therefore their valves remain tightly closed—held together by the contracted adductor muscles. They dig themselves into the mud with the foot. In order for the animal to maintain life, food and oxygen-laden water must enter the shell. In some clams, a tube protrudes from the hard shell in such a way that the opening is above the surface of the mud, so that water can enter the tube and pass into the body. The clams we bought at the Kensington Market had thick greyish shells with distinct growth lines, not unlike the rings visible in the cross-section of a tree



Opposite page: In the process of boiling, the blue crab turns red, owing to the destruction of a chemical bond.

Left: The Alaska female shrimp stores her eggs under the flap on the side of the abdomen.



Above: Bivalves, such as the oyster (top), the clam (centre), and the mussel (bottom) keep their valves closed by means of contracted muscles. These muscles are what people like to eat.

Opposite page: The periwinkle and the octopus are edible molluscs. Nowadays they are also used in experimental procedures in laboratories.

trunk. However, these growth lines are not indicators of age as are the rings of a tree. They simply record the story of arrested and resumed growth, owing to changes in temperature, water turbulence, and food supply. Each growth line formed as the shell began to grow again.

Mussels grow on the substrate, where they appear tall and slender. Compared to oyster shells, mussel valves are quite fragile, and they are patterned with fine growth lines, because in the shallow waters and brackish estuaries in which the mussels live there are constant variations which interrupt growth of the shell. Mussels from Canada's east coast are purple, those from the west coast brown, presumably because of a difference in the mineral content of the bottom.

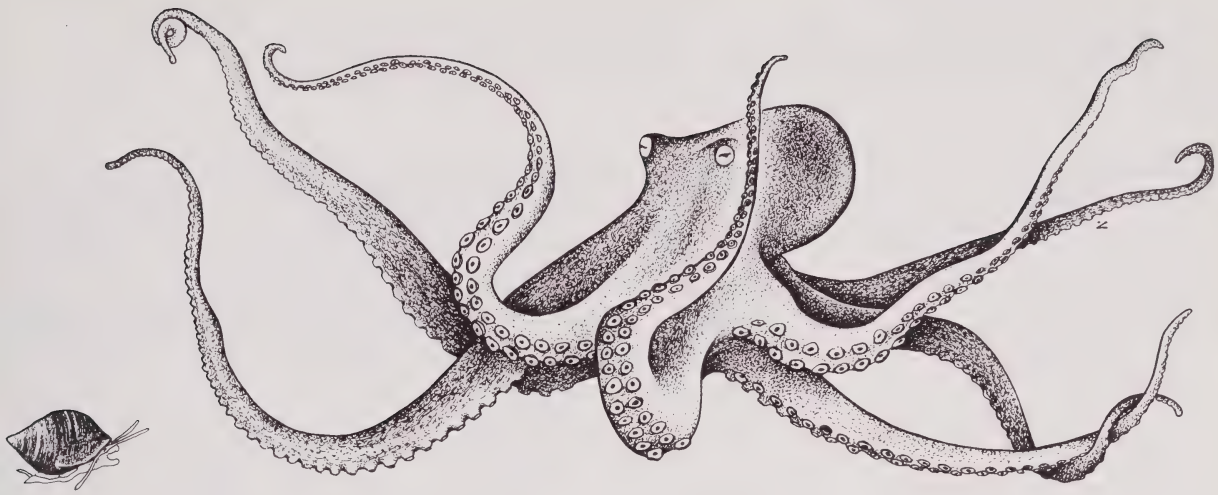
To remain firmly fixed on the bottom, the mussel ties itself down by means of a waterproof thread exuded from the byssus gland in the foot. This thread is the only soft part of the animal that is not eaten, and it is so strong that chemists have tried to synthesize a similar material for use as a fixative for dental fillings. Once settled on the substrate, the mussel has no further use for its crawling foot. It winds the byssus thread round the foot's stalk, which it then uses as a spool for secure anchorage in changing tides.

The octopus and the squid are fleshy molluscs without an external shell. On their heads they bear a crown of sucker-studded arms on which they crawl—thus the name cephalopods (head feet). Beneath the arms on the sides of the head are two huge eyes with eyelids. An octopus can express its feelings by wrinkling the area around the eyes. This activates the chromatophores, which are scattered all over the body, and the animal changes colour—becoming red, green, brown, almost any colour of the palette. When an octopus is frightened, it literally turns white.

Cephalopods catch fish on the suckers of their arms and then bite the victims to death with the beak. Both the octopus and the squid are very fast swimmers (the squid is the faster of the two) and their bodies are muscular and elastic. For rapid propulsion, water is forced through a narrow nozzle into the body cavity. When the body is fully expanded, the nozzle closes by means of a valve. Then the muscles contract, and water shoots from the nozzle, propelling the animal in the opposite direction. Squids also possess a pair of fleshy fins, which can be used as brakes when the animals wish to swim at a leisurely pace.

Most cephalopods have the remnant of a shell inside their bodies. The vestigial shell inside the squid is in the shape of a pen, and close to it there is an ink sac. Cephalopods compensate for the lack of an external shell by shedding ink into the water to create an ink screen behind which they can escape their predators.

By observing the habits of squids, fishermen found that they could catch them by trailing a dummy squid from the end of a line. The animals follow the dummy, and when they are close enough the fishermen capture their prey simply by scooping them out of the water. The octopus can be caught by a ruse. Fishermen dangle unbaited pots from a line. The animal mistakes the pot



for a cave in which to hide and crawls into it. Commercially, cephalopods are caught in nets or are speared.

The many and varied seafood dishes listed on restaurant menus attest to the popularity of seafood. Not only does seafood taste good, but it is low in fats and high in protein and provides the energy we require to withstand the strain of modern life. Shrimps are 27.6 per cent protein, and oysters are 6.2 per cent; the protein contents of the other crustaceans lie somewhere between those two figures.

Each year hundreds of these animals find their way into laboratories, where they are studied for a variety of purposes. Ethologists study the octopus to find out more about its capacity to learn. The periwinkle, now of less importance as a food than it was in Dickens's day, has found its place in experiments carried out by geneticists. Physiologists study the nerves and muscles of crustaceans, and geologists use bivalves to determine units of geological time.

Thus with dwindling food resources on earth, man turns his efforts to farming the sea, which yields him a harvest of crustaceans, molluscs, and cephalopods—for food and for experiments that may lead him to a better understanding of himself.

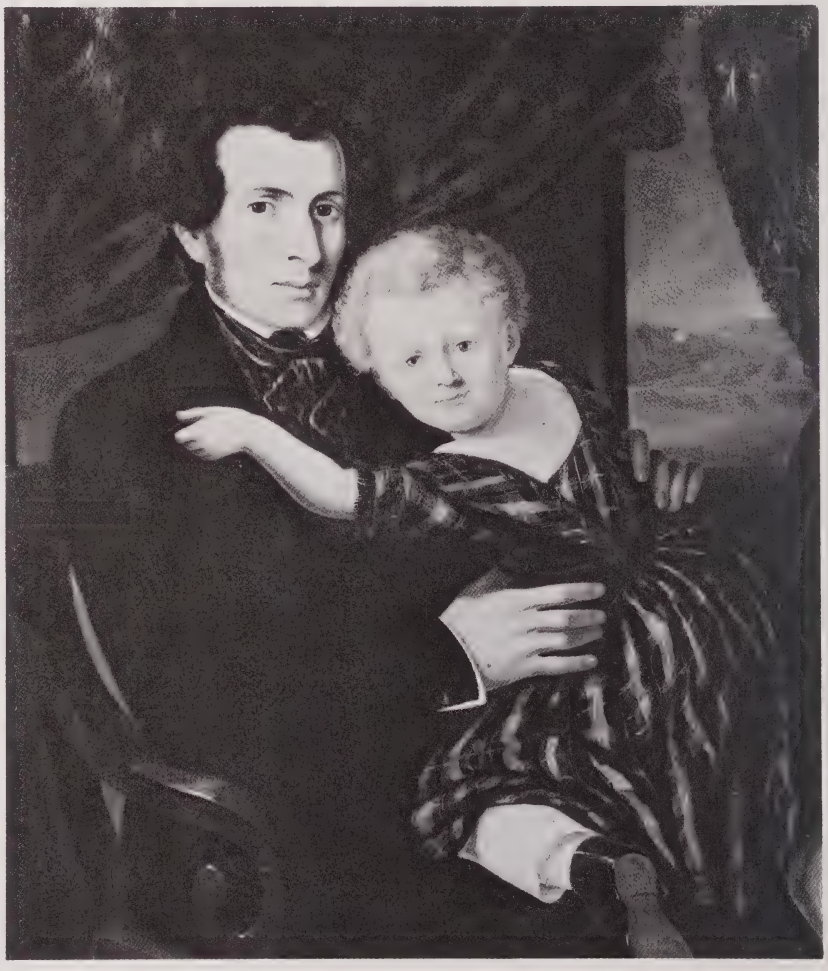
Renate Carson joined the ROM *in 1976 and is a Curatorial Assistant in the Department of Invertebrate Zoology. She was born in Czechoslovakia and educated in England and the United States, where she obtained an M.Sc. in biology from the American University. After a short teaching career she joined the staff of the Smithsonian Oceanographic Sorting Center in Washington, D.C. Before her move to Canada in September 1975, Ms. Carson spent a summer at the Marine Biological Laboratory in Woods Hole, Massachusetts.*

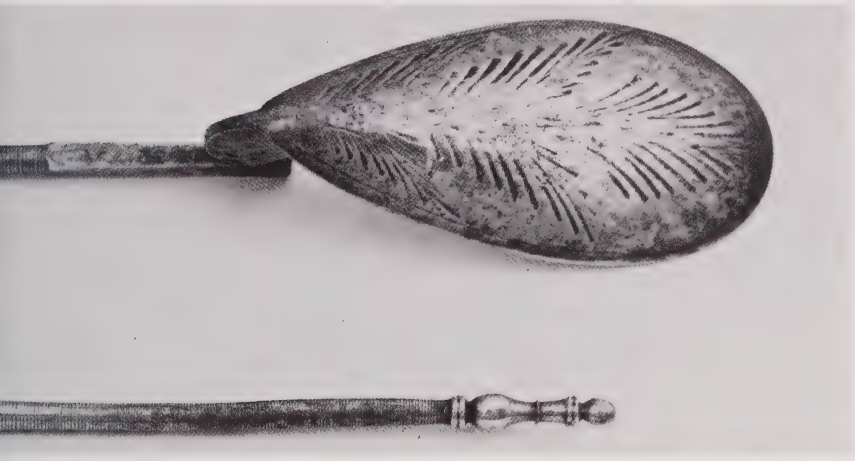
The Growing Collections

The striking double portraits of the Williamson family (*William Williamson and his son Alexander,* oil on canvas, 42 inches by 33 inches; and *Margaret Erskine Williamson and her daughter Jessie,* oil on canvas, 42 inches by 33 inches) were painted in Toronto by Cornelius Krieghoff about 1845. At that time William Williamson was a clerk with Gamble & Boulton, Barristers-at-Law, and he owned several houses on Church Street near Shuter Street. The portraits would have been especially treasured by the family since Margaret Williamson died in 1846 soon after the portraits were painted. The children were born in 1841 and 1842, and Jessie (later Mrs. Alfred Hoskin) lived until 1931.

These portraits are possibly the only works executed by Cornelius Krieghoff in Canada West. Krieghoff was living in Rochester in 1844. Late in the year he visited Europe and probably stopped briefly in Toronto on his return, before settling in Montreal in 1845. He preferred to paint landscapes and scenes of daily life, but in the 1840s Toronto's demand was for portraits. Krieghoff executed this commission in richly contrasting colours and textures, juxtaposing plaids and laces, straw and colour, against a dark background. Mrs. Williamson's portrait is rich in references, as it shows her seated in a vine-covered arbour, hat and parasol by her side, child with dog on her lap, and a white rose on the table. The house in the background was traditionally said to be their Church Street residence, but the style of architecture and the mountainous background suggest otherwise.

M.A.





The Greek and Roman Department has lately been able to enlarge its collection of ancient silver ware. The most recent addition is a pair of late Roman silver spoons, of a type common in the 4th century A.D. They are produced by a combination of several techniques, including hammering, incision, and turning. A typical feature for this type of spoon is a disc, plain or elaborate, linking the bowl with the long rod-handle. An engraved leaf spray decorates the underside of each of the bowls of our two specimens.

N.L.

The ivory-coloured jade pendant illustrated is one of the finest recent acquisitions in the Far Eastern Department. It adds to the strength of an already well-known collection of Chinese jade, while filling a gap in the sequence of types represented. Estimates of date in already published works range from the 8th to the 13th century. It is certain, however, to come from the "dark millennium" in Chinese jade history noted by Howard Hansford and currently of interest to jade scholars. In other words, it is later than Han (206 B.C. – A.D. 220) and earlier than Ch'ing (1644–1911). Most striking, perhaps, are the colour and style. The former is traditionally called "chicken bone" white in China and is the result of the whitening of an originally translucent jade in burial or through burning. The style represents a play on themes and motifs current during Warring States into Han times, or from the 4th century B.C. to the 3rd century A.D. The main figure is that of an S-curved bird-dragon, with crest and wings and scroll-and-dot patterning on the body. The suggestion of interlacery at the centre is especially graceful, relieving the abstraction and confirming the intimate relation of the larger to the smaller creature. The character of the piece comes from its ornamental rather than slavish archaism. The date is most likely to fall between the 12th and 14th centuries A.D., within the early period of the later Chinese passion for "antique elegance".

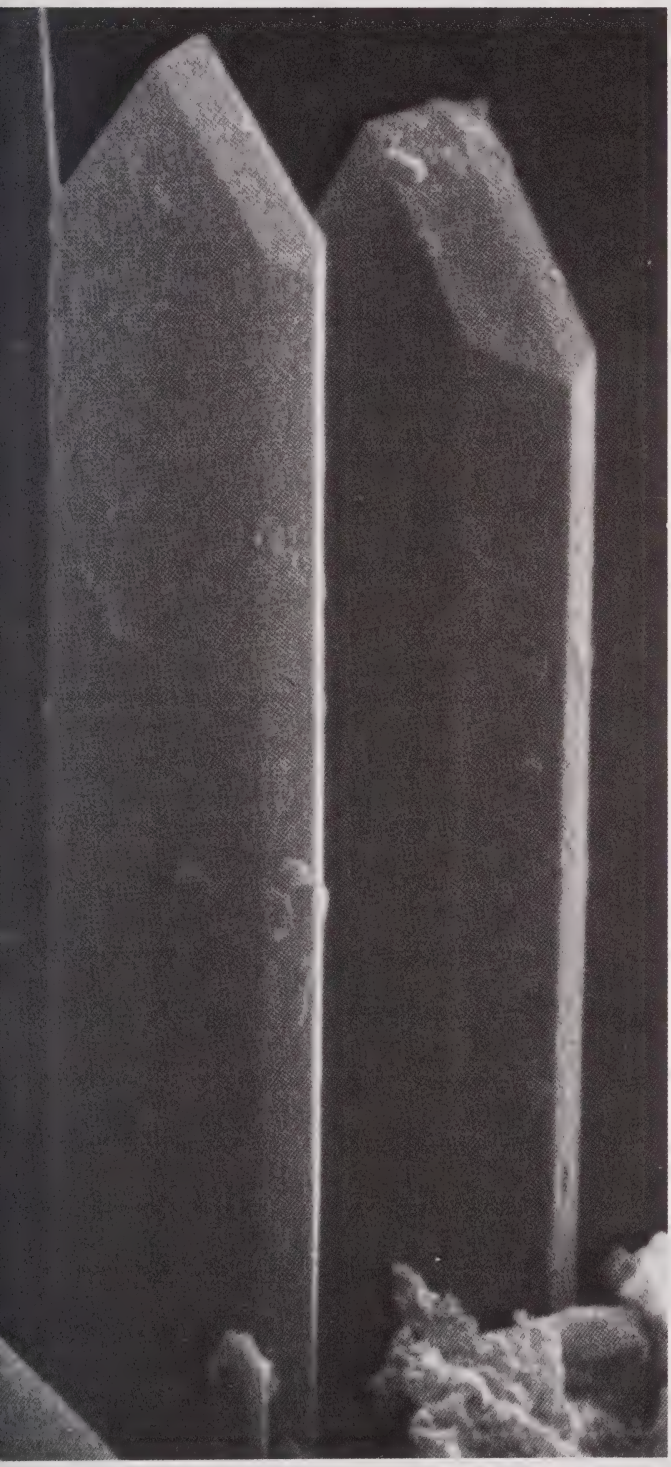
D.D.

Parnassius clodius claudianus Stichel of the family Papilionidae.

The Entomology Department has been fortunate in acquiring the major part of a large collection of Lepidoptera collected by Mr. John Gordon of Vancouver. Mr. Gordon has, over the years, assembled an extensive series of British Columbia butterflies, which is perhaps unequalled elsewhere in Canada. More than 700 of the near-perfect specimens in his collection are now permanently housed at the ROM. Of particular scientific interest is the extensive coverage of the fauna of northern British Columbia, an area poorly represented in most collections. Many of the specimens constitute new distribution records for British Columbia.

In total, nearly 100 species native to British Columbia are included, ranging from the large and colourful to the relatively small and elusive. With the addition of this material to the already extensive collection of Canadian Lepidoptera, the ROM collection is now truly transcontinental in scope.

R.J.



Since the last report on the mineral collections, about 40 species have been acquired that were not previously represented in the ROM collections. A few were received as gifts, some were acquired by exchange (eight rare Russian species from Prof. E.I. Semenov on behalf of IMGRE, Moscow, U.S.S.R.), but most of them were obtained by purchase. Fortunately, rare species are still within the means of our limited budget, but regrettably, showy display specimens are not. Of the 40 species added to the collections recently, some are species described many years ago that the ROM simply has not been able to obtain, but the majority are newly described species of which there are about 50 each year. These new species are chemical compounds not previously known to occur in nature.

One of these is the new mineral mandarinoite (illustrated), named in 1978 in honour of Dr. J.A. Mandarino, Curator and Head of the Department of Mineralogy and Geology at the ROM. The honour accorded Dr. Mandarino is in recognition of his many important contributions to the science of mineralogy. Mandarinoite was first found at the Pacajake Mine, near Hiaco, Colquechaca, Bolivia and is a ferric-iron selenite ($Fe^{3+}_2Se_3O_9 \cdot 4H_2O$). It occurs as minute green crystals, less than half a millimetre long, associated with penroseite. The possibility that these green crystals might be a new mineral was recognized by W.W. Pinch of Rochester, New York, who brought the specimen (from his private collection) to the attention of Pete J. Dunn (Smithsonian Institution, Washington, D.C.), Donald R. Peacor (University of Michigan, Ann Arbor), and B. Darko Sturman (ROM) who co-authored the description of mandarinoite in *The Canadian Mineralogist* (Volume 16, Number 4). The specimen in the ROM collections is part of the material used in the original description and was presented by Mr. Pinch. Subsequently, mandarinoite has been found from three other localities: Skouriotissa Mine, Cyprus; El Plomo Mine, Ojojoma District, Tegucigalpa, Honduras; and De Lamar Silver Mine, Owyhee County, Idaho. A specimen from the last locality was acquired by exchange with the University of British Columbia.

R.I.G.

Potter by the Maitland

David W. Burns

David Newlands

OF THE MANY CRAFTSMEN of 19th-century Ontario, the potter had an ideal medium in which to express his creativity. Clay was abundant throughout most of southern Ontario and it could be moulded with great ease into many different shapes. In fact, its scope was limited only by the potter's own skills and the requirements of his customers. A pot cost little to produce and if it did not turn out well, there was no great monetary loss.

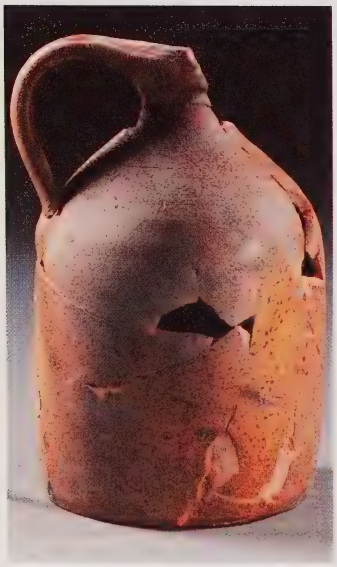
A peripatetic craftsman, the 19th-century potter learned his trade as an apprentice and then moved to another workshop for more experience and a starting wage—averaging about $250 a year in 1871. Most of Canada's potters were immigrants from Great Britain, Germany, France, and the United States, with British potters representing about half of the number who settled in Ontario between 1851 and 1881. One such immigrant family was the Burns family, who came to Canada from Northern Ireland. By 1852 John Burns had settled on Yonge Street in Toronto. The relationship of David W. Burns to John Burns has not been established, but we know that David was only nine years old at the time of his arrival in Toronto. Where he learned pottery making we have yet to discover.

By 1861 David Burns had left Toronto and was living on Lot 46 of the Maitland Concession in Goderich Township—about four kilometres from Holmesville in Huron County. He set up a workshop on land owned by Bernard Evans, who had purchased the property from the Canada Company, speculating that the grey clay would be a good basis for a profitable pottery and drain tile business. David Burns was only 16 years old when he began

Opposite page, top: Reconstructed fruit or tomato jar made by Burns. The narrow mouth of the jar was closed with a cork to seal the contents and prevent growth of mould.

Opposite page, bottom: View of Kiln B facing east. The arrangement of flues and the central platform for stacking wares are clearly visible.

Below: Farmers used a great number of milk pans to skim cream. The size and shape of this reconstructed milk pan are typical of wares produced throughout Ontario during the 19th century.



to make pottery at this site along the Maitland River—a young age for a potter to be an independent operator.

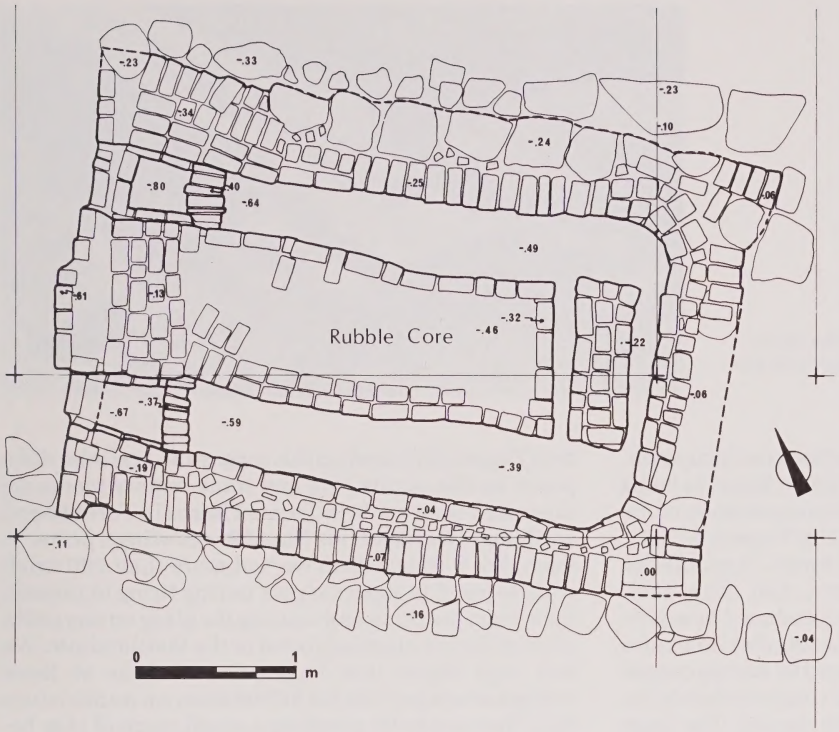
According to tax assessment rolls and census returns for the township, David Burns was both a potter and a farmer; like other 19th-century Ontario potters, he combined his craft with a second occupation. Burns continued to operate the pottery until about 1900, when he retired. He died of pneumonia in 1907.

In later years a cooperage and an apple business were established on the property. Now ancient sentinels, a few of the trees of the old orchard still stand among the tall grasses and wildflowers on the sloping hillside once occupied by the pottery. In 1916 David Burns's son John sold the land, and the pottery shed and brick kiln were destroyed. In 1974 only a few feet of the kiln structure remained—mostly the lower part of the structure, which had been protected from brick hunters by the heavy foliage.

In time there were fewer and fewer people left who could remember the pottery. In 1974 we were able to find only two people in the area who could recall the workshop in operation. Mrs. John (Daisy) Torrence of Bayfield, a great granddaughter of Bernard Evans, wrote of her visits to the pottery: "My youngest brother and I used to help carry the unbaked pots to place them in the bake oven (kiln), which was built on a small knoll." Another person who remembered the pottery was Clifford Lobb, a retired Clinton merchant, who as a boy watched David Burns make pots on a foot-powered wheel. Clifford Lobb used to visit the potter as he worked in his small wooden building—about 5 metres by 6 metres. To the west of this pottery shed was the brick kiln, which was entered through the shed. According to Clifford Lobb, the kiln was a little more than 2 metres high and had a domed roof. Burns fuelled the kiln by feeding wood through two fire doors on its west wall. Clifford Lobb remembers hearing the potter say, "Well, I'm going to burn (fire) some pottery."

In 1974 the Royal Ontario Museum received a letter from a resident of the area, mentioning the pottery and inviting a ROM representative to visit the site. It was a cold spring day, with the last ridges of snow still piled by the roadside, when I first saw the site, in the company of some students. About 10 metres back from the road was an accumulation of brick, just visible over the sod line. Were these the remains of the pottery kiln, we wondered, as we carefully traversed the land? Further into the lot, down the gently sloping hill towards the Maitland River, our field party located a concentrated deposit of pottery sherds, which had been moved about by recent ploughing. Two pottery sites on the same lot suggested that the accounts of the old-timers about two kilns might be true. What was left for us to discover was whether the kiln close to the roadside was the later kiln and the one on the grassy knoll the earlier one, as Daisy Torrence claimed.

In May of 1974 a joint archaeological excavation was undertaken by the Royal Ontario Museum and Wilfrid Laurier University, of Waterloo, the first of two cooperative historical archaeology field projects. Dr. Eduard Riegert of the university was joint director, with the author, of the Burns excavation. Sixteen students set up tents on a farm about a kilometre from the pottery site. For 20 days they dedicated themselves



Opposite page, left: Jug reconstructed from fragments found on the site.

Opposite page, right: Stove tube and flower pot. These were both produced in large quantities because they were in steady demand. Stove tubes were also used at times as drainage tiles.

Left: Measured drawing of Kiln B, showing two parallel flues and two cross-flues.

to field work, often in freezing rain and in the face of the cold spring breeze blowing off Lake Huron. However, the results of the excavation (and the hot meals prepared by Mrs. Mervyn Lobb of Clinton, who with the assistance of her daughter-in-law always had plenty of good food ready for the crew at the end of a hard day) buoyed the morale of the diggers in the worst weather. Harry Thompson of Clinton and Bill Hart of Seaforth provided a good deal of practical assistance during the course of the field work.

Excavations at the site of the kiln on the knoll (Kiln A, which was indeed the earlier of the two kilns) provided a large number of sherds, each of which was carefully washed, registered, and packed for shipment to the ROM. At the roadside kiln (Kiln B), the base of a well-preserved kiln and many associated pottery sherds were found. Kiln B was 2.75 metres by 4.25 metres in dimension, rectangular in shape, and built of brick and stone. Two parallel flues ran the length of the structure and were connected by two cross-channels, one at the east end and one about 75 centimetres from the east end. Large stones had been placed against the north and south walls of the kiln to prevent their collapse. When the stones along the south wall were removed, a line of drainage tiles packed with pottery debris was uncovered. The drainage system had been laid sometime after the kiln began to operate, probably to prevent the structure from shifting, since the heavy kiln had been built right on the clay subsoil. Although the heat from the kiln fires had baked the clay subsoil to a terracotta colour, it had not prevented the land outside the kiln from subsiding from the weight of the structure.

The details of construction of the kiln can be seen in the photograph of the southwest corner of the structure. A trench was dug for the foundation of the kiln and the outside face of the outer wall was built of two or three courses of stone, on which the brick superstructure was laid. The inside face of this wall was also of brick, laid directly onto the clay subsoil. The interior platform on which the pottery was stacked for firing consisted of two brick walls, with a fill of rubble between them, and a surface of brick. The centre of this platform had been damaged by pot-hunters before we excavated, but it was still possible to record the architectural details with precision. A measured drawing of Kiln B reproduced the kiln after it had been excavated.

There have been very few pottery kilns excavated in Ontario, and the closest parallel to the Burns structure is the pottery kiln at Jordan, Ontario, dated to the 1820s and built by B. Lent. Other excavated kilns are circular, with a brick base, as at the Huron Pottery in Egmondville, or a stone base, as at the William Eby Pottery in Conestogo. It appears that the design of a kiln was a subjective decision, presumably based on what the potter had learned during his apprenticeship.

The Burns kiln we excavated was of simple design and was made of ordinary house bricks, suggesting that after a number of firings the brick would probably crack and the structure would have to be repaired or completely rebuilt. Fire bricks would have been a better material for construction, but the abundance of local clay meant that the least expensive way to build the kiln was to use the nearby clay.

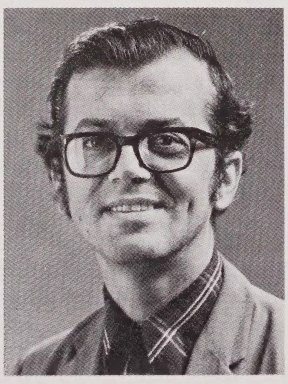
From the 20,000 sherds that were recovered from both

Southwest corner of Kiln B showing the stone foundation to the outer face of the wall and the brick-lined flues.

kiln sites, a number of vessels have been reconstructed, whole or in part. The pieces that were closest to being whole were used as guides for the interpretation of the shapes that were represented by rim fragments only. David Burns turned out utilitarian forms—jugs, crocks, bowls, flower pots, candle-holders, and drain tiles. Glaze colours ranged from yellow (produced by applying a clear lead glaze to the buff-burning clay) to shades of pink and green (probably produced by mixing copper oxides or other available chemical compounds into the glaze before it was applied to the wares). The large number of sherds is now being analysed, but preliminary results indicate that David Burns produced a very limited variety of wares. In the later years there were only three or four basic shapes, and each of these in only two or three sizes. Whether this limited range of production can be attributed to a corresponding lack of talent on Burns's part, or whether it is attributable to the vagaries of archaeological recovery is hard to say at this time.

During the study of the artifacts it was suggested that since clay is a very impressionable medium, fingerprint analysis might tell us more about the number of employees (if any) at the pottery, and about the relationship between David Burns and the members of the Burns family who settled in Toronto. (Two of the student diggers followed up this suggestion and later did a paper on the results.) We had some pottery pieces we knew had been made by Samuel Burns in Toronto and we thought we might find David Burns's fingerprints on them. For a comparison we had more than 200 small wedges (used to separate pots during firing to prevent them from touching and causing the glaze on one pot to stick to that on another) found at the Maitland site. We had high hopes that fingerprint analysis of these wedges would provide the information we wanted since they were made by pinching a small piece of clay between the thumb and forefinger and then shaping the top with the second thumb. However, the results of the study proved disappointing since, as the police researchers reported to us, most of the prints were indistinct and not sufficiently diagnostic to provide a record of the potter's fingers.

When we left the Maitland site at the end of May 1974, we had the kiln and the trenches filled with gravel. We hope that this snug covering will preserve the site until an architectural conservancy group or historical society can restore the remains of the kiln, possibly as an historical restoration for the people of the rural area, who have never seen a pottery in operation, but who have much to be proud of in the history and the products of this country pottery.



David Newlands is Head of the Department of Museum Studies at the ROM *and lecturer and coordinator for the Museology Programme at the University of Toronto. Before his appointment in Museology, he was Curatorial Fellow at the Canadiana Department, where he pursued an active programme of historical archaeology in Ontario. He has excavated at three 19th-century pottery sites (two in Ontario and one in New York), and at historic Fort York, Toronto. Mr. Newlands frequently writes articles on archaeology and Ontario potteries for magazines, and is now preparing a major study of the 19th-century potteries of Ontario. He is senior author of* An Introduction to Canadian Archaeology, *published in 1976 by McGraw-Hill Ryerson, Toronto.*

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